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New Zealand. State Forest Service. Annual Report of the Director of Forestry for the year ended 31st March, 1934.—17 pp., 1934.

The following items of phytopathological interest occur in this report (compiled by A. D. McGavock). A very marked increase in the numbers of dead saplings in young exotic forests of the pole stage (consisting mainly of *Pseudotsuga taxifolia*, *Pinus laricio*, *P. ponderosa*, *P. muricata*, *P. murrayana*, *P. radiata*, and *Cupressus lawsoniana*) was observed following a protracted drought in the Nelson district, probably due to the renewed activity of *Diplodia* [*pinea*] killing [*R.A.M.*, xiii, p. 553] in dense stands of weakened stock. Owing to the virtual absence of late frosts during October and November, the virulence of *Phomopsis* [*strobi*: loc. cit.], which caused a severe wilt in the above-mentioned forests during the two past seasons, was greatly mitigated. Experiments in refrigeration chambers have shown that *P. strobi* gains entry into the pine tissues chiefly through the minute lesions produced by frost on early flushing shoots. It has been found that fungal diseases are commonly introduced on tree seeds, and attempts are in progress to develop an effective, simple, and cheap routine method of disinfection.

ZELLER (S. M.). **Some new or noteworthy fungi on Ericaceous hosts in the Pacific Northwest.**—*Mycologia*, xxvi, 4, pp. 291–304, 1 pl., 5 figs., 1934.

An annotated list is given of 25 parasitic and saprophytic fungi occurring on Ericaceae in the Pacific North-west, of which the following may be mentioned. The leaves of *Arbutus menziesii* are destructively attacked by *Mycosphaerella arbuticola*, sometimes causing severe defoliation.

Exobasidium burtii n. sp., producing circular, buff spots, 1 to 2 cm. in diameter, on the leaves of *Rhododendron albiflorum*, is characterized by hypophyllous, tetrasporous basidia, 18 to 28 by 5 to 7 μ; stout, prominent sterigmata; early triseptate (sometimes one cell longitudinally septate), hyaline, ellipsoid to allantoid basidiospores, 17·7 to 24 by 5 to 6·5 μ; and abundant hyaline, continuous, narrow, cylindrical, usually straight conidia, 7 to 13 by 0·7 to 1·5 μ. This species was doubtfully referred by Burt (*Ann. Missouri Bot. Gard.*, ii, p. 650, 1915) to *E. vaccinii*. Notes are also given on *E. ledi* on *Ledum glandulosum*, *E. parvifolii* [ibid., vi, p. 646] on *Vaccinium parvifolium*, *E. vaccinii* on a

large number of hosts (including *Arctostaphylos*, *Rhododendron*, and *V.* spp.), and *E. vaccinii-uliginosi* [ibid., vi, p. 587], the causal organism of a witches' broom with white or pinkish leaves on *R. californicum* (cf. *Phytopath.*, x, p. 273, 1920), witches' broom of *V. ovatum*, and 'shoot galls' of *A. columbiana* and *Phyllodoce empetriformis*.

Cryptostictis arbuti (Bonar) Zeller (*Disaeta arbuti* Bonar: *Mycologia*, xx, p. 299, 1928) is associated with a leaf spot of *Arbutus menziesii*, *L. glandulosum*, and *A. columbiana*. *C. mariae* (Clinton) Sacc. appears to be identical with the fungus usually referred to *Coryneum rhododendri* Cke. It produced on *R. californicum* leaves characteristic 'bull's eye', concentric spots, 4 to 25 mm. in diameter. The sole essential difference between these two species of *Cryptostictis* is the number of septa in the spores (four in *C. arbuti* and five in *C. mariae*).

Lachmund (H. G.). **Seasonal development of Ribes in relation to spread of Cronartium ribicola in the Pacific Northwest.**—*Journ. Agric. Res.*, xlix, 2, pp. 93–114, 1 graph, 1 map, 1934.

The author gives a summarized account of inoculation experiments with the white pine blister rust, *Cronartium ribicola*, on four species of *Ribes*, namely, *R. petiolare*, *R. inerme*, *R. viscosissimum*, and *R. lacustre* (the most important in the Pacific North-west), conducted since 1926 in British Columbia. The results showed that the leaves were susceptible to aecidiosporal infection from the time they broke out of the buds, the periods of highest susceptibility ranging in general between the ages of 2 and 16 days, after which susceptibility declined, in some cases very sharply.

The most favourable period for spread by aecidiospores occurs when the maximum spore dispersal from a given infected pine centre coincides with the time when the largest proportion of the *Ribes* leaves lying within the long-distance range of air-borne spores are in the most susceptible stages of development. There was evidence that variations in seasonal conditions affect more the time at which the *Ribes* leaves develop than the time of aecidiospore production. Thus, an early spring advances the development of the leaves to a stage beyond maximum susceptibility at the time when the production of aecidiospores is greatest. It may, however, favour spread to higher altitudes and to the north, where spring is later and the *Ribes* leaves may be in more susceptible stages of development. A late spring should have an opposite effect. In general, conditions advancing spring in the north and retarding it in the south tend to extend the range of favourable conditions for long-distance spread of the rust, and vice versa. The farthest northward spread may be expected from infected pines growing at high altitudes to *Ribes* plants at low elevations in the north, and the longest southward spread from aecidiospore sources at low altitudes to *Ribes* at high elevations farther south.

Percival (W. C.). **A contribution to the biology of Fomes pini (Thore) Lloyd (Trametes pini [Thore] Fries).**—*Bull. New York State Coll. of Forestry* (*Tech. Publication* 40), vi, 1 b, 72 pp., 20 figs., 4 graphs. 1933. [Received November, 1934.]

After noting the host range and geographical distribution of *Trametes*

pini, the author (who prefers the name *Fomes pini* as the sporophores are perennial and the tubes stratified) states that the hyphae grow saprophytically in the heartwood of infected red spruce (*Picea rubra*) but were not found in the living cells of the sapwood, the evidence indicating that the fungus enters this host only as a saprophyte.

In New York the spores of *T. pini* are released most abundantly during two short periods, one in spring, the other in early autumn, when after a cool spell the prevailing temperature rises to over 50° F.; very light spore production continues as long as the average weekly temperature is over 32°, while a continuously maintained temperature of over 50° induces hyphal growth in the sporophore tubes and the development of a new tube layer.

In culture, spore germination was favoured by media with a high sugar content, reaching 93·2 per cent. on malt agar. High germination took place only on media the P_H value of which lay between 5 and 6; on alkaline media there was no germination. Media rich in sugar were also those most favourable to mycelial growth, which was, however, little affected by the P_H value. The mycelium grew at a temperature range of 6° to 30° C., the optimum being about 25°. Exposure to light through window glass caused darkening of the mycelium, which was accentuated, with the suppression of aerial hyphae, by exposure to the ultra-violet rays in sunlight in addition to the visible spectrum.

When cultures of *T. pini* from *P. rubra*, *Pinus strobus*, and *P. monticola* associated with different types of decay were inoculated into 1-inch blocks of sound red spruce heartwood all the blocks developed typical pocket rot. The loss in specific gravity varied from 4·95 to 10·28 per cent. after nine months, the greatest variation occurring in the blocks inoculated from *Picea rubra*. The loss in crushing strength varied in the same period from 9·3 to 40·9 per cent., the extremes again being given by cultures from the one host, *P. rubra*.

Red rot, pocket rot, and ring scale developed in different woods inoculated with a subculture of the fungus from one individual mycelium, demonstrating that variations in the type of decay caused by *T. pini* are due entirely to host differences.

A bibliography of 85 titles is appended.

Vanine (S. I.) & Kotchkina (Mme E. M.). Фитопатологическое обследование подсоченных насаждений в Сиверском Леспромхозе. [A phytopathological survey of stands tapped for turpentine in the Siverskaya forest estate.]—*U.S.S.R. Central Forest. Res. Inst. Bull.* 2 (*Problems of Forest Protection*), Leningrad, pp. 67–83, 3 figs., 3 diags., 1 graph, 1934. [English summary.]

During a four-year survey of the pine and spruce trees utilized for turpentine extraction in the Siverskaya forest estate (near Leningrad), a number of blue-staining fungi were observed, their incidence being much higher in trees subjected to the Russian than to the German method of tapping. Where the former method is adopted, the stains may cover 30 to 80 per cent. of the tapped surface by the fourth year, whereas in the latter only the salient edges of the cuts are involved. In no case were the fungi observed to penetrate below a depth of 2 mm. in the wood. Spruces are more extensively damaged

than pines by blue-staining fungi, and are further liable to attack by *Corticium leve*, which causes a yellowish-brown discoloration from the second year of extraction onwards and reduces the value of the timber.

The wood-staining fungi recorded on tapped pines included *Ceratostomella picea* [*R.A.M.*, xii, p. 195], *Endoconidiophora coerulescens* [ibid., ix, p. 76], *Cladosporium herbarum*, *Epicoccum purpurascens* [ibid., xii, p. 69], and *Fusarium* sp., and on the spruces the same, with *Ceratostomella pini*, *Hormonema dematioides* [ibid., xi, p. 616], *Macrophoma* sp., and *Corticium leve*. Tests to determine the resistance of these [and a number of other] species to temperature showed that *Ceratostomella picea* and *C. pini* survived one hour's exposure to 60° C., while *Cladosporium* sp., *H. dematioides*, and *F.* sp. proved resistant to fluctuations of temperature between 20° and –19° C.

Oleoresin and turpentine were found not to be toxic to the agents of blue stain, the former in a solidified state merely acting as a mechanical check on mycelial progress.

NELSON (R. M.). **Effect of bluestain fungi on Southern Pines attacked by bark beetles.**—*Phytopath. Zeitschr.*, vii, 4, pp. 327–353, 2 figs., 1 diag., 2 graphs, 1934.

A comprehensive, fully tabulated account is given of the writer's investigations in North Carolina on the connexion between blue-staining fungi (*Ceratostomella pini* and *C. ips*) and bark beetles (*Dendroctonus frontalis* and *Ips* spp.) in three species of pine, viz., *Pinus echinata*, *P. rigida*, and *P. virginiana* [cf. *R.A.M.*, xii, p. 409].

The blue-stain fungi were observed to grow from points along the insect galleries to form irregular, black patches on the surface of the wood. The hyphae further invade the sapwood along the medullary rays to form wedge-shaped sectors of blue wood, being also found in the resin ducts and occasionally in the ray and wood tracheids.

Many of the trees inoculated with the two species of *Ceratostomella* developed blue stains, and some died. *C. pini* is thought to be probably indispensable to *D. frontalis*, since it effects a reduction of the water content of infested trees sufficient to admit of beetle brood development. The girdling effect of the insect tunnels would eventually destroy the invaded pines, but the primary cause of death is believed to be the action of the staining fungi on the tori in the wood tracheids. In affected areas the tori of the bordered pits are mostly deflected to one side in such a way as to block the opening and prevent the passage of the transpiration stream from one tracheid to another.

LIESE (J.) & STAMER (J.). **Vergleichende Versuche über die Zerstörungsintensität einiger wichtigen holzzerstörenden Pilze und die hierdurch verursachte Festigkeitsverminderung des Holzes.** [Comparative experiments on the destruction intensity of some important wood-destroying fungi and the resultant decline of firmness in the wood.]—*Angew. Bot.*, xvi, 4, pp. 363–372, 2 graphs, 1934.

Observations were made under controlled conditions on the progressive destruction of pine sapwood blocks by pure cultures of *Merulius domesticus* [*M. lacrymans*], *M. sylvester* [*R.A.M.*, xiii, p. 609], *Conio-*

phora cerebella [*C. puteana*: ibid., xiii, p. 70], and *Polyporus vaporarius* [*Poria vaporaria*: ibid., xiii, p. 137].

M. lacrymans was found to cause the maximum loss of weight, amounting to about 45 per cent. of the total after six months, followed by *C. puteana* (35), *P. vaporaria* (22), and *M. sylvester* (10 per cent.). *M. lacrymans* was also responsible for the greatest decrease in the firmness of the wood as determined at the wood-testing station in Berlin-Dahlem on carefully selected anatomically similar laths of sapwood (98 per cent. loss after six months), the most rapid progress being made both by this organism and *C. puteana* during the first two months. Thus, a 50 per cent. loss of firmness corresponds, in the case of *M. lacrymans*, to a 10 per cent. reduction of weight; for *C. puteana* a 60 per cent. decline in firmness coincides with a 20 per cent. decrease in weight. The other two fungi caused a relatively inconsiderable diminution of strength. Evidently the fungi select different constituents of the cell wall in order of preference, those singled out by *M. lacrymans* in the first place being such as impart solidity to the tissues. The reputed preference of *M. lacrymans* for cellulose is not borne out by these experiments, since the fungus first withdraws the encrusting components that act as binding elements.

These data are considered to throw fresh light on the serious character of the depredations of the dry rot fungus and to afford further justification for its special position in litigation. Of late years attention has been primarily directed towards the ravages caused by *C. puteana* in insufficiently dried new structures, but *M. lacrymans* also possesses the capacity, not shared by other important timber-destroying fungi, of spreading to air-dry wood in the absence of ventilation [ibid., xii, p. 259].

DIDDENS (HARMANNA A.). **Eine neue Pilzgattung, Hyalodendron.** [A new fungus genus, *Hyalodendron*.]—*Zentralbl. für Bakt.*, Ab. 2, xc, 14–19, pp. 315–319, 4 figs., 1934.

In 1933 a number of fungus cultures isolated from ground pulp in Swedish paper factories were submitted by Prof. Melin to the Centraalbureau voor Schimmelcultures for identification. All were of a more or less yeast-like appearance and exerted an antagonistic action on the blue-staining organisms [*Cadophora fastigiata*, *Lecythophora lignicola* Nannf., and *Trichosporium heteromorphum* Nannf.] recently investigated by Melin [*R.A.M.*, xiii, p. 531]. Most of the cultures were referable to the Mycotoruleae [ibid., xiii, p. 767], but three could not be assigned to any known genus. These were characterized either by moist, coarsely pubescent, rugose, dirty yellow colonies or by those of a pure white, dry, almost pulverulent aspect. A true hyaline mycelium was present, and chains of minute, hyaline conidia were borne laterally and terminally on the dendritic conidiophores. A new genus, *Hyalodendron*, is established for these fungi and, together with the type species, *H. lignicola* n. sp., described in German and Latin.

The conidiophores of *Hyalodendron* resemble those of *Hormodendrum*, but are hyaline. The sweet pea parasite in England named by Dowson *Cladosporium album* [ibid., iii, p. 652] agrees closely with *Hyalodendron* which also possesses, in a less conspicuous form, the polar projections

typical of *C. herbarum*. The author proposes, therefore, to transfer the sweet pea fungus from *Cladosporium* to the new genus *Hyalodendron* as *H. album* (Dowson) n. comb. Both in spore dimensions (3·5 to 15 by 2·5 to 5·5 μ) and specific parasitic behaviour the latter differs from the pulp species.

Hyalodendron differs from *Oidiodendron* [ibid., xii, p. 69] in that in the latter the conidia are formed by hyphal division and not by acrogenous and pleurogenous budding.

The conidia of *H. lignicola* are mostly oval to elongated or irregular, furnished in some cases with polar projections, and measure 4·8 by 2·3 μ or 2·5 to 12 by 1·5 to 3·5 μ (mostly 2·5 to 6 by 2 to 2·5 μ).

Two distinct forms of *H. lignicola* were further differentiated as f. *undulatum* n.f. and f. *simplex* n.f., the former characterized by an undulant mycelium and sometimes by a spiral rolling of the hyphal tips, and the latter by predominantly simple conidial chains, often springing vertically from the hyphae.

Good growth was made at 25° C. by the pulp fungi on a number of standard media, of which beerwort agar was particularly suitable for differential purposes; on wood (*Acer* and *Pinus*) development was relatively sparse.

RICHARDSON (N. A.). **A note on creosotes extracted from old timbers.**—*Journ. Soc. Chem. Ind.*, liii, 33, pp. 710–712, 1934.

Details are given of a recent examination of creosoted Baltic redwood (*Pinus sylvestris*) railway sleepers and telegraph poles after varying periods of service (25 to 30 years in the case of the former and 18 to 57 in that of the latter). It was found that the higher boiling oils possess a greater degree of permanency than the low boiling ones [*R.A.M.*, ix, p. 620]. The tar acids had not entirely disappeared from the wood even after a number of years, while in the case of the sleepers a fairly large quantity of naphthalene was left. The sleepers were well preserved by creosotes of high naphthalene content, whereas the poles were adequately protected by oils containing only small amounts of naphthalene. The estimated losses of creosote from the sleepers and poles are 50 to 90 and 60 to over 90 per cent., respectively. Determinations of two residual oils showed that these were less toxic than ordinary creosote to wood-destroying fungi [cf. ibid., xiii, p. 137].

HURST (R. R.). **Observations on the brown heart disease of Turnips.**—*Scient. Agric.*, xiv, 12, pp. 679–686, 1 pl., 1 map, 1934. [French summary.]

The physiological disorder of turnips known as brown heart [*R.A.M.*, xi, p. 276] causes an annual loss of at least $50,000 in Prince Edward Island, where though widely distributed, it is not prevalent in the north; the condition is also found on the mainland of Canada, as well as in the United States and Europe. The affected turnips have a bitter taste and are woody when cooked. Four strains, Metts Bangholm (Godfrey), Halls Westbury (Ewing), Good Luck (Steel Briggs), and Carters Purple Top Swede are immune. Date of seeding and soil reaction did not affect the incidence of the disease, but increased manuring diminished its

incidence and it did not develop in plants growing on the former sites of manure heaps.

SNYDER (W. C.). **A leaf, stem, and pod spot of Pea caused by a species of Cladosporium.**—*Phytopath.*, xxiv, 8, pp. 890–905, 3 figs., 1934.

Peas in Monterey County and elsewhere along the Californian coast were observed in 1932 to be suffering from a leaf, stem, and pod infection estimated to be responsible for a reduction of 5 to 10 per cent. or more of the picked crop. On the foliage the necrotic lesions are roughly circular to irregular, tan-coloured, with a narrow, dark brown edge. On the stems and pods they are of variable shape, dark brown to black, with well-defined black lines of demarcation on the latter organs.

The causal fungus produced a dull, greenish-black, submerged mycelium, and uni- to pluriseptate, simple, brown conidiophores, 75 to 225 μ in length, bearing clusters of light brown, concatenate conidia of two types, (*a*) ovoid to ellipsoid, somewhat pointed at the ends, continuous or occasionally uniseptate, 5·2 to 12·5 by 3·7 to 5·5 μ (average 8·7 by 4·4 μ), and (*b*) elongated, sub-cylindrical, slightly pedicellate, continuous to uni-, rarely biseptate, 12·5 to 23·7 by 4 to 5·5 μ. The optimum temperature for growth was from 20° to 22° C., the minimum between 3° and 8° and the maximum between 31° and 34°. The fungus is referred to the genus *Cladosporium* as *C. pisicolum* n. sp.

Inoculations gave positive results, the most severe infection occurring on Morse's 200, Laxton's Progress, and Laxtonian peas, while two (Alaska and Canada Field) were resistant. Moderate infection was secured on broad beans (*Vicia faba*) in greenhouse but not in field trials; the fungus was not pathogenic to cowpeas, *Vigna sesquipedalis*, or sweet peas. Foliar infections develop within three to seven days after inoculation under favourable conditions of high humidity and moderate temperature.

Primary infection by *C. pisicolum* may occur either through the soil or from the seeds, many of which from diseased pods show discoloured spots, and these when sown give a varying percentage of infected seedlings. Surface sterilization was not completely effective in preventing this. The presence of the fungus in the pods may induce hair-like proliferations of the inner membrane, resulting in white, felty patches extending into the pod cavity. A similar hyperplasia of the epithelial lining of the latter may arise as a result of infection by *Ascochyta pisi* [*R.A.M.*, xiii, p. 611] and *Peronospora viciae* [ibid., xii, p. 412], as well as from free moisture or mechanical agencies.

HARTER (L. L.). **A new wilt of Peas.**—*Phytopath.*, xxiv, 8, pp. 950–951, 1934.

Attention is drawn to the occurrence in various parts of the United States of an atypical form of pea wilt characterized by moderate stunting, yellowing and desiccation of the leaves, and a brick or bright red discoloration of the hypocotyl or epicotyl or both, sometimes involving most of the root but not usually extending far up the stem. Three species of *Fusarium*, differing from *F. orthoceras* var. *pisi*, the agent of common pea wilt [*R.A.M.*, xiii, p. 143], were isolated from

diseased material and determined as *F. oxysporum* var. *aurantiacum* [ibid., xi, p. 306], *F. vasinfectum* var. *lutulatum* [ibid., xiii, p. 128], and *F. redolens* [ibid., xii, p. 317]. Soil inoculations gave positive results (except with *F. redolens*, which was not common and was not tested), up to 30 per cent. of the peas planted in the infested ground developing the above-mentioned symptoms. Infection has been observed on peas in virgin soils both in the greenhouse and field, indicating the general prevalence of the causal organisms, but the incidence of the wilt is higher where peas have repeatedly occupied the same land.

PIERCE (W. H.). **Resistance to common Bean mosaic in the Great Northern field Bean.**—*Journ. Agric. Res.*, xlix, 2, pp. 183–188, 2 figs., 1934.

In continuation of his studies of bean (*Phaseolus vulgaris*) common mosaic [*R.A.M.*, xiii, p. 488], the author gives a brief account of field and greenhouse tests of nine strains of Great Northern UI field bean (a selection made in 1927 from commercial Great Northern), the results of which showed these strains to be completely immune from the disease [cf. ibid., xi, p. 561], and to possess some tolerance to yellow bean mosaic (bean virus 2) [ibid., xiii, p. 488]. Inoculation experiments did not indicate any difference in mosaic resistance among the strains, all of which significantly outyield the mosaic-susceptible common Great Northern, and three of which are now being commercially grown in Idaho.

STAPP (C.). **Die Fettfleckenkrankheit der Bohnen.** [The grease spot disease of Beans.]—*Die Kranke Pflanze*, xi, 9, pp. 97–99, 1 pl., 1934.

A popular description is given of the grease spot disease of beans [*Phaseolus vulgaris*], caused by *Pseudomonas* [*Bacterium*] *medicaginis* var. *phaseolicola* [*R.A.M.*, xiii, p. 490], the ravages produced by which since its recognition in Germany in 1928 are stated to be very considerable. Varietal reaction trials conducted by the writer demonstrated the absolute resistance to infection of Holländischer Schwert, Allererste weisse Treibbohne [earliest of all white forcing bean], and Kaiser Wilhelm, and the virtual freedom from disease of Kronprinz, Osborn's Treib, Unerschöpfliche [Inexhaustible], Hundert für Eine, four types of Zucker Perl, Wachs Mont d'Or, and Wachs Schlachtschwert. The use of such varieties is considered to be by far the most important control measure and is strongly urged.

VERPLANCKE (G.). **Contribution à l'étude des maladies à virus filtrants de la Betterave.** [A contribution to the study of the filterable virus diseases of the Beetroot.]—*Mém. Acad. Roy. Belgique, Cl. Sci.*, Sér. II, 1451 (xiii, 1), 104 pp., 4 pl., 1 diag., 1 graph, 1934.

This is an expanded and fully tabulated account of the writer's studies in Belgium on mosaic and yellows of the beetroot, the principal results of which have already been noticed from another source [*R.A.M.*, xiii, p. 210].

Stehlík (V.). **Einfluss des Bodens auf die Anfangsentwicklung der Rübe mit besonderer Rücksicht auf die Rübenkrankheiten.** [The influence of the soil on the initial development of the Beet with special reference to Beet diseases.]—*Zeitschr. für Zuckerind.*, lviii, 50, pp. 437–444; 51, pp. 445–452; 52, pp. 453–455, 10 figs. (2 col.), 1934.

In the deep, medium-heavy, permeable, alkaline soils best adapted to beet cultivation, root rot (*Pythium de Baryanum* and *Phoma betae*) [*R.A.M.*, xiii, p. 490] is stated to be of negligible importance in Czecho-Slovakia. The disease may, however, assume a serious form in acid, encrusted soils, sometimes developing into 'girth scab' [*Actinomyces* spp.: ibid., xii, p. 25]. The physical and constitutional properties of various soil types in relation to beet culture are fully discussed.

Krüger (W.), Wimmer (G.), & Lüdecke (H.). **Beitrag zur Frage der Bekämpfung der Herz- und Trockenfäule der Zuckerrüben. Feldversuche.** [A contribution to the problem of the control of heart and dry rot of Sugar Beets. Field experiments.]—*Zeitschr. Vereins Deutsch. Zucker-Ind.*, lxxxiv, 8, pp. 507–536, 8 figs., 1934.

A comprehensive, fully tabulated account is given of a series of experiments in the control of heart and dry rot of beets [*R.A.M.*, xiii, p. 743] carried out on an estate at Wernersdorf, Silesia, from 1929 to 1932 with a by-product of soda manufacture supplied by the German Solvay Works, Ltd., Bernburg, Anhalt, and termed the 'Bernburg preventive'. It contains a high percentage of easily decomposable hydrous double silicates of lime, aluminium, and iron capable of neutralizing both acid and alkaline soils. The preventive was applied at the rate of 10, 20, or 40 doppelzentner per hect. On the whole the results of the treatment were very satisfactory, the beneficial effect on the health of the crop being apparently correlated with the correction of the excessively alkaline reaction of the soil.

Similar results were obtained in a series of tests conducted by the management of the estate with sulphur at the rate of 8 doppelzentner per hect.

Townsend (G. R.). **Bottom rot of Lettuce.**—*Cornell Agric. Exper. Stat. Memoir* 158, 46 pp., 10 figs., 3 graphs, 1934.

Bottom rot (*Rhizoctonia* [*Corticium*] *solani*) is stated to be the most important disease of lettuce in New York [*R.A.M.*, xi, p. 491], where the annual loss from this source is estimated at 30 per cent. of the crop, representing an average financial equivalent of some $500,000 per annum.

The incubation period of the disease, which is characterized by sharply defined necrotic lesions on the petioles and midribs of the basal leaves, is forty-eight hours under optimum conditions of warmth and humidity, namely, a mean daily temperature above 19·5° C. (67° F.), a daily minimum above 10° C. (50° F.), and humid weather. During the formation of the lesions, drops of an amber liquid are exuded from the tissues. Should infection be arrested before the destruction of the entire head, the lesions are transformed into sunken, chocolate-brown spots. The

leaf blade is completely disorganized by the fungus, and in severe cases all that is left of a solid head is a dry, black mummy.

The organism penetrates the leaf either through the cuticle or the stomata, and after the phase of active invasion is past it remains viable in the decayed tissue and produces sclerotia (also formed in the soil around the plant) and resistant mycelium, enabling it to survive adverse conditions. The minimum, optimum, and maximum temperatures for the growth of the lettuce strain of *C. solani* in culture are 10°, 26°, and 32° C.

Bottom rot may be effectively controlled by a single application, by a traction duster, of 20 to 25 lb. per acre of ethyl mercury phosphate, the cost of this treatment being about $15 per acre and reducing the expenditure on production by roughly 8 cents per crate, the number of which will be correspondingly increased from 500 to 700 per acre.

WELLMAN (F. L.). **Weather conditions associated with seasons of severe and slight Celery early-blight epidemics in Florida.**—*Phytopath.*, xxiv, 8, pp. 948–950, 1934.

In the Sanford district of Florida the most important fungous disease of the valuable celery crop is early blight (*Cercospora apii*) [*R.A.M.*, xii, p. 495]. In 1931–2 a severe epidemic occurred, whereas in 1933–4 the damage from this source was comparatively slight. Neither temperature nor rainfall differed sufficiently in the two seasons to account for this difference, which is attributed to variations in the relative amounts of fog and dew. During 1931–2 the frequent warm east winds from the Atlantic were accompanied by much fog and dew, whereas in 1933–4 cool, dry, northerly winds prevailed.

GUBA (E. F.). **Control of the Verticillium wilt of Eggplant.**—*Phytopath.*, xxiv, 8, pp. 906–915, 2 figs., 1934.

None of the eggplant varieties tested at the Massachusetts Agricultural Experiment Station for resistance to wilt (*Verticillium albo-atrum*) gave any promise of being of value for the development of resistant strains, and [as previously stated: *R.A.M.*, xii, p. 494] the establishment of new plantings each year on naturally acid sod land (below P_H 5·0) appears to be the sole means of combating the disease in the field. In the greenhouse no infection occurred below P_H 5·0 where acidification was effected by aluminium sulphate, and only a slight incidence followed the use of inoculated sulphur to produce a P_H of 4·0 to 4·2, but attempts at field control by applications of these substances showed that this method is not practicable.

BEWLEY (W. F.) & HARNETT (J.). **The cultivation of Mushrooms.**—63 pp., 6 pl., 1 fig., 11 diags., London, Shepherd & Hosking, 1934.

This little manual deals in a popular style with the practical aspects of mushroom (*Psalliota campestris* and *P. arvensis*) cultivation in England, including brief notes on the occurrence and control of pests and diseases [*R.A.M.*, xiii, pp. 213, 286]. In addition to a brief description of the mushroom, with a discussion of the various types of spawn in past and present use, chapters are devoted to the adaptation or construction of sheds, glasshouses, frames, caves and tunnels, and ridge beds;

the preparation, spawning, and casing of the beds; and care of the beds, picking, grading, and packing.

FERRARIS (T.). **Brevi note fitopatologiche di stagione.** [Short seasonal phytopathological notes.]—*Rivista Agricola*, xxx, 689, pp. 296–297, 1934.

Between 10th and 20th June, 1934, owing to rainy periods followed by hot spells, with frequent morning mists in low-lying districts, vine mildew [*Plasmopara viticola*] was very severe on the fruit clusters in northern Italy, the yield in some localities being reduced by at least one-third in spite of the usual treatments. The author recommends the addition to 1·5 per cent. Bordeaux mixture of ammonium chloride at the rate of 125 to 150 gm. per hectol. [*R.A.M.*, x, p. 245]. The weather also favoured vine *Oidium* [*Uncinula necator*], for the control of which the author urges the use of natural sulphur dusts with copper ('zolfi gregi ramati') [ibid., viii, pp. 545, 701], which are very adhesive and do not cause scorching.

CHEVALIER (G.). **Les bouillies cupro-ammoniacales.** [Cupro-ammoniacal mixtures.]—*Prog. Agric. et Vitic.*, cii, 28, p. 62, 1934.

Prompted by the recent increase in the interest shown by vine-growers in cupro-ammoniacal mixtures [*R.A.M.*, xiii, p. 354] for the control of vine mildew [*Plasmopara viticola*], the author determined the copper content at varying periods after preparation of ordinary Burgundy mixture and of the same mixture to which 1·5 kg. ammonium sulphate [per 100 l.] was added either before or after incorporating the soda solution in the copper sulphate solution. The results showed that while the ordinary Burgundy mixture contained 560 and 229 mg. dissolved copper [per litre] after six and thirty hours, respectively, that to which the ammonium sulphate was added directly to the copper sulphate solution contained 1,499 and 410 mg., and that in which the ammonium sulphate was added after mixing the copper sulphate and soda solutions contained 1,090 and 408 mg. dissolved copper, respectively.

While providing an explanation for the favour shown to the cupro-ammoniacal mixtures in practice, these findings also support Branas's and Dulac's views [ibid., xiii, p. 645] that the efficacy of copper-containing mixtures against vine mildew is mainly determined by their content in dissolved copper.

ARMET (H.). **Les bouillies célestes au sulfate d'ammoniaque et solutions cupriques aux composés tartriques.** ['Bouillies célestes' with ammonium sulphate, and cupric solutions with tartaric compounds.]—*Prog. Agric. et Vitic.*, cii, 26, pp. 19–23; 27, pp. 45–47; 29, pp. 86–89, 1934.

After a brief reference to the preparation of 'eau céleste', which was first applied in 1886 to the control of vine mildew [*Plasmopara viticola*] in France, and to its advantages and defects, especially its scorching effect on the vine foliage, the author describes the preparation of a

mixture (termed by him 'bouillie céleste' normale), the basic formula of which is 1 kg. copper sulphate, 1·4 kg. carbonate of soda, and 1 kg. ammonium sulphate per 100 l. water [cf. *R.A.M.*, xiii, p. 354]. Stronger concentrations may be obtained by multiplying the weights of all the constituents by a common multiple. This formula gives a maximum of dissolved cuprammonium hydrate in the mixture, but where the simultaneous presence in the latter of soluble ammoniacal copper and of colloidal copper is desired, the doses of carbonate of soda and ammonium sulphate may be reduced. This mixture possesses the same capacity of dissolving cellulose as 'eau céleste', but does not scorch the vine leaves, and is easier and quicker to prepare. It is more fluid and more wetting than the ordinary Burgundy mixture, requiring an expenditure of spray liquid superior to that of the latter by 20 to 25 per cent., thus compensating for the reduction in the copper content of the mixture. Small-scale trials in 1927 indicated that it was decidedly more efficacious than the ordinary copper-containing mixtures, and at least as effective as neutral copper acetate solutions. It is recommended not to use ammonium sulphate produced by gas works, because of the impurities contained in it.

Of equal efficacy in the control of *P. viticola* is stated to be another mixture with the basic formula 1 kg. copper sulphate, 750 gm. neutral potassium tartrate, and 500 gm. carbonate of soda. An additional advantage of this mixture is the fact that it may promote the growth of the vine leaves by supplying the latter with ready-made tartaric acid, a compound which is normally elaborated by the vine foliage.

VENKATARAYAN (S. V.). **Are sprayed Grapes poisonous?**—*Journ. Mysore Agric. & Exper. Union*, xiv, pp. 22–24, 1933. [Abs. in *Chem. Abstracts*, xxviii, 19, p. 6211, 1934.]

Grapes sprayed with Bordeaux mixture against pathogenic organisms [in India] were found to contain about 2·5 to 3 mg. copper per kg., an amount only slightly (0·5 to 1 mg.) in excess of the maximum detected in untreated fruit. There can be no risk of poisoning from the consumption of the disinfected product [cf. next abstract].

BENVEGNIN (L.) & CAPT (E.). **Influence des traitements cupriques sur la valeur hygiénique des produits de la Vigne.** [The influence of copper treatments on the hygienic value of the products of the Vine.]—*Annuaire Agric. de la Suisse*, xxxv, 6, pp. 667–682, 1934. [German summary.]

It was shown by analytical studies [the results of which are discussed and tabulated] at the Lausanne Viticultural Experiment Station that the amount of fungicidal copper actually found in the wine prepared from Bordeaux-treated vines is infinitesimal (0·5 mg. per l. after six months' storage) and completely uninjurious to health [cf. preceding abstract]. The copper content of the wine after fermentation is completed is ordinarily not correlated with that in the grape must, while that in the latter is much less than the copper adhering to the surface of the grapes, e.g., when the vines have received a late treatment.

Rapport sur le fonctionnement de l'Institut des Recherches Agronomiques pendant l'année 1933. [Report on the work done by the Institute of Agronomic Researches during the year 1933.]—195 pp., Paris, Imprimerie Nationale, 1934.

The following are among the many items of phytopathological interest contained in this report. Experiments at Versailles and elsewhere in France failed to confirm the view that susceptibility to degeneration diseases is less marked in potato 'seed' of mountain origin than in equally healthy and clean seed obtained from low-lying districts [*R.A.M.*, xiii, pp. 178, 535].

Rainfall was not an indispensable condition for germination of the oospores of vine mildew (*Plasmopara viticola*), which in 1933 was induced by high temperatures and an atmospheric humidity approaching saturation [cf. ibid., xiii, pp. 149, 678]. Under the weather conditions that prevailed during the year, Cabernet Sauvignon vines at Grande-Ferrade which received the full treatment recommended by the Station d'avertissements agricole at Bordeaux against *P. viticola* gave a yield taken as 100 per cent., as against 88 per cent. for those given one treatment between 15th June and 1st July, 84 per cent. for those given one treatment between 15th May and 15th June, 58 per cent. for those given one treatment between 1st and 20th May or 1st and 31st July, and 40 per cent. for those left untreated; thus, the yield of the latter was reduced by 60 per cent. although the year was not favourable to mildew. The herbaceous organs of Paulme vines affected with deformation-anthracnose contained a mycelium apparently analogous with that described by Ranghiano in court-noué [ibid., xiii, p. 616]; it was characterized by intercellular hyphae of varying diameter, sometimes swollen into round vesicles of very unequal size.

The different degrees of infection by *Puccinia glumarum*, *P. triticina*, and *P. graminis* on a large number of wheat varieties at Colmar are tabulated; in another test the last-named attacked none of the wheats severely, and failed to infect Mentana.

A comparison of the virulence of bunt [*Tilletia caries*] strains from different localities on Bon Fermier, B 2, and Red Hussar wheat showed that maximum infection was produced on the first by strains from Colmar, Breslau, and the Ardennes, on the second by those from the Aisne, Colmar, and Breslau, and on the third by strains from Breslau and Cassel.

Of a large collection of Cucurbitaceae the only ones that remained unaffected by *Erysiphe cichoracearum* [ibid., xiii, p. 419] were *Cucurbita moschata* and *Benincasa cerifera*. *Verticillium dahliae* and *Pythium megalacanthum* were isolated from melons showing a wilt and collar canker [ibid., iv, p. 495; vii, p. 180; xii, p. 731]; inoculations with pure cultures of the two fungi gave positive results only with the latter.

Attempts to establish whether seed transmission of bean mosaic [ibid., xii, pp. 413, 741; xiii, p. 489] occurs gave inconclusive results; under the experimental conditions the Nain de Chevilly variety remained practically unaffected.

Rhizoctonia [*Corticium*] *solani* was isolated from rotted *Stachys affinis* [crosnes or Japanese artichoke] plants.

Evidence was obtained by Mlle Frémont at Lille that plants attacked by parasites react by the formation of agglutinants and precipitins; broad bean [*Vicia faba*] tissues after repeated injections of *Bacillus proteus* showed the presence of an antibody analogous to the lysin-producing principle which develops in animal organisms treated with the same antigen [cf. ibid., xiii, p. 177]. Plants into which an organism is inoculated do not contain vaccinating substances for the organism, but on the contrary their extracts augment its virulence.

Plantesygdomme i Danmark 1933. Oversigt, samlet ved Statens plantepatologiske Forsøg. [Plant diseases in Denmark in 1933. Survey of data collected by the State Phytopathological Experiment Station.]—*Tidsskr. for Planteavl*, xl, 2, pp. 258–300, 3 figs., 2 graphs, 1934. [English summary.]

The usual lines have been followed by E. Gram and his collaborators in the compilation of this report [*R.A.M.*, xiii, p. 151], which includes the following new records for Denmark. One case of mosaic in Spanish pepper [*Capsicum annuum*: ibid., xii, pp. 354, 759] was observed, and the same disorder is believed to have been responsible for stunting and leaf curl of potted *Myosotis* plants. *Bacterium sojae* [ibid., xi, p. 315] caused a leaf spot of soy-bean plants cultivated experimentally in various parts of the country. Leaf spots caused by *Phytomonas berberidis* [ibid., xi, p. 109] were observed on *Berberis vulgaris*, *B. canadensis*, *B. crataegina*, and *B. chilensis*.

Jahresbericht der Preussichen landwirtschaftlichen Versuchs- und Forschungsanstalten in Landsberg (Warthe) für das Jahr 1933. [Annual Report of the Prussian Agricultural Experiment and Research Stations at Landsberg (Warthe) for the year 1933.]—*Landw. Jahrb.*, lxxix (Supplement), pp. 1–33, 1934.

The following items of phytopathological interest occur in this report [cf. *R.A.M.*, xiii, p. 9]. Reference is made, in connexion with an account of the potato degeneration studies in progress on five different soil types, to Hey's electrometrical method of gauging deterioration and also to the use of a 0·2 per cent. mercuric chloride solution and rhodamin for this purpose, the principle here being analogous to that involved in Bechhold's copper strip test [ibid., xiii, p. 649].

As wart [*Synchytrium endobioticum*]-resistant substitutes for Industrie the varieties Ackersegen, Erdgold, and Preussen are specially recommended [cf. ibid., xiii, pp. 467, 590]; for Deodara on light soils Sickingen and Stärkereiche [Starchy] I; for Wohltmann on medium and light soils Rotweissragis and on medium to rich soils Robinia.

Efforts were made to discover a substitute for formalin and its polymerization products as a means of combating tomato leaf mould (*Cladosporium fulvum*), these substances, though highly efficacious, being liable to cause severe injury to the plants in ordinary practice. Promising results have been obtained in preliminary tests with certain phenoxy-compounds, the caustic action of which is strictly confined to the area of the mesophyll permeated by the mycelium of the fungus. A few greenhouse plants that remained immune from an attack of leaf

mould destroying the bulk of the crop are being very successfully used for propagation [cf. ibid., xiii, p. 405].

Bericht der Lehr- und Forschungsanstalt für Wein-, Obst-, und Gartenbau zu Geisenheim a. Rh. für das Rechnungsjahr 1933. [Report of the Viticultural, Fruit Growing, and Horticultural College and Research Institute at Geisenheim-am-Rhein for the financial year 1933.]—*Landw. Jahrb.*, lxxix (Supplement), pp. 166–195, 1934.

This report contains the following notes on phytopathological subjects [cf. *R.A.M.*, xiii, p. 9]. Heavy damage was caused during the period under review by the ordinarily unimportant white spot disease of pears (*Mycosphaerella sentina*) [ibid., xi, p. 694], which specially affected the Beurré Clairgeau, Olivier de Serres, Beurré Diel, and Williams's Bon Chrêtien varieties. By the middle of August the diseased trees were more or less defoliated.

Good results were obtained with the following preparations tested on behalf of the pest control committee of the German Viticultural Association against *Peronospora* of the vine [*Plasmopara viticola*]: 1 per cent. cuprosa (Gebr. Borchers A.G., Goslar) [ibid., xiii, p. 449], G. 33 and 1 per cent. copper dust (Wacker, Munich), 1 per cent. Sch. 1132 and Ob 21 (I. G. Farbenindustrie A.G., Höchst-am-Main). Against the combined attacks of *P. viticola* and the vine moths [*Clysia ambiguella* and *Polychrosis botrana*] Silesia copper dust (Güttler & Co., Hamburg) was effective, while Wacker's Bordeaux mixture proved useful in the control of pear *Fusicladium* [*Venturia pirina*].

It was ascertained by means of a newly constructed actinometer that such dark-coloured disinfectants as nosperal, nosperit, nosprasen, and nosprasit [cf. ibid., xii, p. 383 *et passim*] cut off much more sunlight from the sprayed vine leaves than pale ones, e.g., urania green-Bordeaux, Wacker's Bordeaux, Spiess copper arsenate, and the like. When applied in excess, the dark-coloured preparations may cause a loss of 50 per cent. of the rays, with serious consequences to the quality and maturation of the fruit.

The anatomical examination of poorly developed Riparia × Rupestris 101^{14} M.G. vine stocks revealed the almost constant presence of the intracellular cordons characteristic of the 'roncet' disease [ibid., xiii, p. 616], of which the feeble habit of growth is in all probability a precursor. A thorough inspection of 40 Rhenish and neighbouring vineyards showed that weak development and short nodes [court-noué] are very prevalent among 101^{14} M.G. vines and to a somewhat lesser extent in Riparia × Rupestris 3309 C; these external symptoms (which are not apparent on Kober 5 BB) were accompanied in all the cases where detailed observation was possible by the presence in the tissues of intracellular inclusions. The question of roncet control is complicated by the fact that the intracellular bodies are not consistently associated with the disease, and the eradication of otherwise vigorous stocks merely on account of their presence cannot (pending further investigations) be justified. In all cases, however, where weak growth and intracellular inclusions coincide, the removal of the affected vines is clearly indicated.

McRae (W.). **Report of the Imperial Mycologist.**—*Scient. Repts. Imper. Inst. Agric. Res., Pusa, 1932–33*, pp. 134–160, 1934.

The following are among the numerous items of interest in this report of the phytopathological work carried out during 1932–3 at the Imperial Institute of Agricultural Research, Pusa, India. In July, 1932, a survey of the sugar-cane plantations of North Bihar was made to ascertain the intensity of mosaic, which was found to range on the Coimbatore varieties almost exclusively grown in the district from 0·09 to 0·7 per cent. [*R.A.M.*, xiii, p. 268]. The fungus responsible for top rot of sugar-cane at Pusa has been identified as *Fusarium moniliforme* [*Gibberella moniliformis*: ibid., xi, p. 425], the pathogenicity of which was established by inoculations resulting in the typical symptoms of the disease. Further studies by M. Mitra on the *Helminthosporium* disease of sugar-cane involved the comparison of one strain of the fungus from Allahabad and two from Bombay with *H. sacchari* [ibid., x, pp. 437, 759; xiii, p. 12]. Morphologically the three forms were found to be closely related and probably merely local strains of *H. sacchari*. *Rhizoctonia bataticola* [*Macrophomina phaseoli*] was observed on sugar-canes at Pusa.

A species of *Cephalosporium* was isolated from the nodes of sterile rice plants in sporadic patches at the Cuttack Farm [cf. ibid., x, p. 336], and inoculation experiments to test its pathogenicity are in progress.

An apparently undescribed species of *Cercospora* was isolated from dark brown, elongated spots mainly on the under surface of the leaves of *Cannabis sativa*, which in severe cases are almost destroyed by the enlargement and coalescence of the spots.

A species of *Sclerospora* was recorded for the first time on *Panicum trypheron* and found to agree in morphological characters with *S. sorghi* [ibid., xi, p. 635].

Tilletia indica Mitra [ibid., xi, p. 425] was found in a virulent form at Karnal (Punjab) causing up to 20 per cent. damage on a number of wheat varieties. This smut, like *T. tritici* [*T. caries*], has a distinctly fishy smell [ibid., xii, p. 277], but unlike the latter it rarely infects more than a few spikelets on each ear.

Uspulun again gave effective control of *Helminthosporium sativum* and *H. teres* on barley [ibid., xii, p. 13] and also checked *Ustilago hordei* on the same host. In the T. 21 variety the percentage of *Helminthosporium* attack was reduced by it from 4·72 to 0·05 and of covered smut from 1·5 to nil. Cawnpore 251 and 252 barleys were the only two attacked by both species of *Helminthosporium*, whereas all but one of the nine varieties grown were affected by *H. teres*.

Negative results were given by pot and plot inoculation experiments on chilli with eight strains of *Fusarium* suspected of responsibility for wilt disease of this crop [ibid., xi, p. 426].

McRae (W.). **India: new diseases reported during the year 1933.**—*Internat. Bull. of Plant Protect.*, viii, 9, pp. 199–202, 1934.

Rice was observed to be infected during 1933 by the A form of *Rhizoctonia bataticola* [*R. lamellifera*: *R.A.M.*, xii, p. 727], while in Madras (according to S. Sundararaman) the same crop was attacked by *Fusarium moniliforme* var. *majus* [ibid., xii, p. 590; xiii, p. 323], which

caused a foot rot of the affected plants. Seed disinfection controlled the disease. Sugar-cane in Burma was infected by *Cercospora kopkei* [ibid., xiii, p. 686]. J. F. Dastur reported an attack of spotted wilt on tomatoes in the Central Provinces. S. L. Ajrekar found that spore balls of *Tolyposporium penicillariae* [*Ustilago penniseti*: ibid., xii, p. 367] lying in the fields are the sole source of infection on *Pennisetum typhoideum*, the flowers of which are alone subject to invasion. S. Sundararaman investigated a citrus disease in the Salem district of Madras characterized by gradual dwarfing and chlorosis of the foliage (excluding the veins), a crowded appearance of the crown due to a profusion of small twigs, stunting of the fruits, and progressive die-back of twigs and branches. The disorder appears to be closely allied to, or identical with, mottle leaf [ibid., xiii, p. 573].

TEMPANY (H. A.). **Annual Report, Department of Agriculture, Straits Settlements and Federated Malay States, for the year 1933.**—60 pp., 1934.

In the section of this report dealing with the work of the Mycological Division [by A. Thompson] it is stated that oil palm stem rot [*Fomes noxius*: *R.A.M.*, xiii, p. 215] is most prevalent in Malaya on poorly growing palms but that it easily spreads, if unchecked, to more vigorous ones. The disease, however, progresses so slowly that inspections at intervals of six months followed by applications of the usual control measures where necessary should suffice to check it. Charcoal base rot of oil palms (the cause of which is being investigated) occurred in two localities.

Tapioca [*Manihot utilissima*] tubers developed a rot due to *F. lignosus*.

Pisang Embun bananas at Bentong were affected by Panama disease (*Fusarium* [*oxysporum*] *cubense*) [ibid., xiii, p. 586].

Pythium aphanidermatum caused a collar disease of tomatoes [ibid., xiii, p. 194].

HANSFORD (C. G.). **Annual Report of Mycologist, 1933.**—*Ann. Rept. Dept. of Agric. Uganda, for the year ended 31st December, 1933* (Part II), pp. 48–51, 1934.

During the period under review, blast (*Piricularia* sp.) of *Eleusine coracana* [*R.A.M.*, ii, p. 259; xii, pp. 77, 395] was very prevalent at Serere, Uganda, as well as in the local native plots. It was most prominent early in the season on the leaves, on which it produced rounded or lenticular spots with a central grey to pale olive area underneath; when these extended across the base of the leaf, the distal part withered. Later, the culms were attacked, usually just inside one or more of the leaf sheaths, where an elongated, greyish, subsequently brown to blackish-brown spot appeared, involving most of the culm tissues at the point of attack. Affected culms of the more slender types of *E. coracana* often collapsed. Much of the culm infection occurred two or three inches below the head, which was often killed. In other instances, infection took place near the base of one or more 'fingers', which failed

to develop further, though the rest of the head might grow normally. Affected plants in poor soil remained stunted and unproductive. The disease also affected smaller native grasses, especially a species of *Digitaria*. *Gibberella saubinetii* attacked the base of a number of *E. coracana* plants, infection usually occurring in patches, especially on poor soil.

In an Appendix a full account is given of an experiment carried out in the course of the cotton blackarm (*Bacterium malvacearum*) investigations at Serere [ibid., xiii, p. 289, and below, p. 97], in which strips of S.G. 29 and S.P. 1 (a selection from the South African U. 4/4/2) cotton were sown on 26th May, 19th June, 12th July, and 12th August from untreated seed and seed treated either with abavit B or 413a dust. The best germination was obtained from the last-named treatment, with an average increase of 6·5 per cent. over the controls. The seed treated with abavit B had a lower percentage of germination than the controls. The seed dusted with 413a also gave a significantly better yield than the untreated seed, the lowest significant difference being 23·8 lb. per acre; on S.G. 29 this treatment increased the yield by 16 per cent. as compared with the controls.

As regards primary infection, May was significantly the worst date of sowing; the June sowings developed more primary infection than the August ones, but there was no significant difference between July and August. In secondary leaf infection there was no significant difference between the various dates. On the whole the earlier sowings gave better yields than the later ones and seed treatment had more effect on the former than on the latter. Both the angular leaf spot and stem form of blackarm spread much more rapidly in the later sowings than in the earlier ones.

S.G. 29 showed much heavier primary and secondary leaf infection than did S.P. 1, while stem lesions on the former were often much more extensive and remained active longer than those on the latter. The evidence indicated that under weather conditions highly conducive to the spread of the disease the resistance of S.P. 1 can be modified, though it always remains more resistant than S.G. 29, which also gave a much smaller yield.

The cotton wilt previously reported [ibid., xi, p. 353] was increasingly prevalent; the disease was associated with a *Fusarium*, probably *F. vasinfectum*.

Groundnuts were attacked by *Sclerotium rolfsii*, *Rhizoctonia bataticola* [*Macrophomina phaseoli*], and a *Fusarium*, causing wilt diseases with similar symptoms. A leaf spot marked by larger, more diffuse spots than those due to *Cercospora personata* and by the absence of brownish-black conidiophores was caused on the same host by *C. arachidis* [*C. arachidicola*: ibid., xiii, p. 747].

A serious mosaic disease of *Phaseolus* sp. occurred at Serere, the affected plants being stunted, with thickened, wrinkled, curled leaves, and practically no crop. Soy-beans showed a similar condition, unaccompanied, however, by any diminution in yield.

The disease of *Dolichos lablab* previously reported as due to a *Sphaceloma* [ibid., xiii, p. 290] recurred, *Canavalia ensiformis*, but no other legume, also being attacked.

NATTRASS (R. M.). **Annual Report of the Mycologist for the year 1933.**— *Ann. Rept. Dept. of Agric. Cyprus for the year 1933*, pp. 48–57, 2 figs., 1934.

Wheat flag smut (*Urocystis tritici*) was more prevalent in Cyprus in 1933 than in the previous year [*R.A.M.*, xiii, p. 568], irrigated crops being the most severely attacked. The *Cercospora* previously recorded on *Vicia faba* as *C. fabae* [ibid., xii, p. 747] was identified at the Imperial Mycological Institute as *C. zonata*. Attack by *Macrophomina phaseoli* was general and severe on *Phaseolus vulgaris* in most districts, the fungus also causing a root and collar rot of *Vigna* spp. in one area, as well as an almost complete failure of potatoes in the Amiandos-Agros district; it was found, besides, on eggplant, sesame [ibid., xii, p. 267], red currant, *Hibiscus esculentus*, and tomato.

In many of the potato crops of the Mesaoria heavy losses were caused by a virus disease the symptoms of which corresponded with those of streak, while there was also a sudden, widespread appearance of powdery mildew caused by a fungus morphologically resembling *Erysiphe cichoracearum*, the conidia of which measured 25 to 29 by 12 to 14 μ [ibid., viii, p. 150].

Deuterophoma tracheiphila was isolated from the twigs of lemon trees affected with 'mal secco' [ibid., xii, p. 747]; the disease appears to be widespread in Cyprus. From a gummosis and canker of the scion of a freshly planted orange tree a form of *Fusarium lateritium* [ibid., xiii, p. 108] was isolated. What appears to be the same fungus has been found forming pink sporodochia on cankers round the graft union of young oranges.

An investigation was made of a gummosis of the main branches and upper part of the trunk of lemon trees, extending from a few inches to 2 ft. or more and sometimes leading to the drying-out and splitting of the bark. Isolations yielded a fungus [the cultural characters of which are described] which produced a pycnidial stage referable to *Dothiorella* and perithecia resembling *Botryosphaeria* or allied forms but not fully identified as yet. The fungus is capable of causing a slow rot of lemon fruit. From one case of gummosis of the upper branch of a lemon tree with similar symptoms, isolations yielded a *Torula* apparently identical with the *Torula* form of *Hendersonula toruloidea* as described from deciduous trees in Egypt [ibid., xiii, p. 382]. The same fungus was also found on mature *Populus nigra* trees that had died in late summer in the Nicosia district; in November, the bark of the main branches began to peel, exposing a black layer of the *Torula*. The organism was also found, though with a less copious thallospore production, on figs and walnuts.

Poria friesiana was observed, apparently mildly parasitic, on orange trees in an old-established orchard. Olive fruits were attacked by *Macrophoma dalmatica* [ibid., xii, p. 707], apparently the first record of this fungus in Cyprus. *Oidiopsis taurica* was general and severe on tomatoes [ibid., xii, p. 748], often, apparently, in association with a virus disease of the 'fern-leaf' type [see below, p. 108], and was also general on lucerne in the coastal regions, besides being found on *Foeniculum* and *Nicotiana* sp. Perithecia were found on *Foeniculum* and lucerne.

From galls on *Myrtus communis* (commonly affected by this disease in the north coastal region) a *Pestalozzia* was isolated, the 4-septate spores of which measured 27 to 29 by 4 to 6 μ and had 2 or 3 cilia; the fungus agreed on the whole with *P. decolorata*, to which it is provisionally referred. It may possibly cause the gall production [cf. ibid., iv, p. 249].

Shepherd (E. F. S.). **Botanical and Mycological Division.**—*Ann. Rept. Mauritius Dept. of Agric. for 1933*, pp. 21–23, 1934.

A fairly severe outbreak of 'fourth disease', the etiology of which is still obscure [*R.A.M.*, xiii, p. 653], occurred in six-months-old virgin sugar-cane of the B.H. 10(12) variety in the Moka district of Mauritius in May, 1933. Experiments in the transmission of the disorder through infected cuttings are in progress. Pokkah-boeng (*Fusarium moniliforme*) [*Gibberella moniliformis*: ibid., xiv, p. 58] was prevalent on P.O.J. 2725 and 2878, but infection was confined to the leaves and no deaths resulted.

A pineapple wilt was found to be associated with the mealy bug, *Pseudococcus brevipes* [ibid., xiii, p. 586]. At Long Mountain the dry side rot of pineapple fruit and the crown rot reported in 1932 occurred in a serious form; both the Queen and Smooth Cayenne varieties are affected by the former condition while the latter is restricted to Smooth Cayenne.

Bouisol was found to be equally effective with Bordeaux mixture in the control of potato blight (*Phytophthora infestans*) [cf. ibid., xiii, p. 121], easier of preparation, and slightly cheaper. Scab (*Actinomyces scabies*) occurred in a restricted area at Rose Hill.

The application of Cheshunt compound [ibid., i, p. 373] was recommended against a *Pythium* rot of tea seedlings.

A wilt (apparently bacterial) of Dwarf bananas [cf. ibid., xiii, p. 713] was reported from Long Mountain.

[Walters (E. A.).] **Report on the Agricultural Department, St. Lucia, 1933.**—51 pp., 1 pl., 2 graphs, 1934.

In the section of this report dealing with plant diseases (pp. 18–19) it is stated that owing to the absence of any well-defined dry season after the wet weather of the previous year, blossom blight (*Glocosporium limetticolum*) was prevalent in St. Lucia in 1933 and affected the crop rather seriously [*R.A.M.*, xii, p. 689].

The raising of nursery seedlings on new land and in drier localities has practically eliminated all fear of severe outbreaks of scab [*Sporotrichum citri* or *Sphaceloma fawcettii*: loc. cit.] of sour orange [*Citrus aurantium* var. *bigaradia*], while the careful removal and destruction of even slightly infected material has kept the disease under control.

In cacao fields partially abandoned owing to the depressed condition of the market, *Rosellinia* root disease [*R. bunodes* and *R. pepo*: ibid., xi, pp. 26, 698] spreads rapidly. In many cases these fields have been replanted with limes, grapefruit, or coco-nuts. There is no well-authenticated instance of *Rosellinia* invading the uninjured roots of sour orange in St. Lucia, but the fungus is known to invade the wounded roots of this host.

Forty-sixth Annual Report of the Kentucky Agricultural Experiment Station for the year 1933. Part I.—69 pp., 1934.

In an experiment carried out in Kentucky, tobacco stalks inoculated the previous summer with yellow and green mosaic were chopped up, spread on two separate plots and 'disked in' shortly before planting. In an adjacent control plot 368 plants remained healthy for 83 days, when the experiment was discontinued; in the yellow mosaic plot 1·5 and 3 per cent. of the plants developed yellow and green mosaic, respectively; in the green mosaic plot 6·5 per cent. developed green mosaic [*R.A.M.*, xiii, pp. 13, 729]. Mosaic was not carried over during the winter on the roots of infected tobacco left in the field.

In an attempt to develop White Burley varieties resistant to *Fusarium* wilt [*F. oxysporum* var. *nicotianae*: ibid., i, p. 321; vi, pp. 262, 440], 1025 F_2 hybrids between resistant Turkish and susceptible White Burley tobacco segregated into 272 resistant and 753 susceptible lines when inoculated and planted in the field, indicating that resistance is a simple Mendelian recessive. Tobacco varieties ascertained to be practically immune from wilt are Pennsylvania Havana 18, Turkish, and the so-called nicotine-free Havana and Cuba tobaccos developed by Dr. Baur in Berlin.

Extensive inoculation studies with *Bacterium angulatum* [ibid., xiii, p. 14] and *Bact. tabacum* proved that as tobacco leaves age resistance increases until virtual immunity results; the change from extreme susceptibility to resistance takes place in seedlings in a few days. With few exceptions tobacco seed remained free from *Bact. angulatum* even when the pods were inoculated 17 times, provided that the inoculations ceased before they split open.

First crop shoots of first and second year Kentucky-adapted clovers were highly susceptible to, but were not killed by, *Gloeosporium caulivorum* [*Kabatiella caulivora*: ibid., xii, p. 78]. *Colletotrichum destructivum* [ibid., vi, p. 100] is rather common on clover and lucerne varieties in Kentucky, but is only mildly pathogenic to red clovers from various localities. *C. cereale* frequently fruits on dying and dead clover.

An apparently undescribed disease of clover referred to as 'black-patch' and observed in Kentucky for several years past is caused by a septate, dark brown, sterile fungus which produces large black lesions on the leaf surfaces. It occurs on white and red clover in distinct patches during damp weather or on individual plants under unfavourable conditions.

Tisdale (W. B.). **Plant pathology.**—*Ann. Rept. Florida Agric. Exper. Stat. for the fiscal year ending June 30, 1933*, pp. 110-126, [1934].

A. H. Eddins states that in 1933 *Bacterium solanacearum* caused 4 per cent. loss on 1,300 acres of potatoes in northern Florida; in one five-acre field the disease caused a loss of 40 per cent., ranking next to late blight [*Phytophthora infestans*] in the production of tuber rot. Inoculated sulphur applied at the rate of 800 lb. per acre gave good control in one locality, where smaller amounts were less effective and

larger ones reduced the yield. In another area where a small percentage of wilt was present 600 lb. per acre was most effective, while in a third district, where the disease was very rife 400 lb. per acre gave the smallest reduction in yield but a larger percentage of wilt than the heavier applications, which materially reduced the yield.

Observations by R. K. Voorhees showed that, as in every year since 1928, *Diplodia zeae* ranked first, *D. macrospora* second, and *D. frumenti* [*Physalospora zeicola*: *R.A.M.*, xii, p. 366] third in causing seedling, stalk, and ear rot diseases of maize [ibid., ix, p. 712].

Experiments by M. N. Walker in soil temperature tanks showed that the most favourable temperature for the development of *Fusarium* wilt of watermelons [*F. niveum*: ibid., xii, p. 495; xiii, p. 560] is about 27° C.; the fungus caused abundant injuries at all temperatures down to 18°, at which point the germination of the seed was very definitely retarded. At temperatures over 30° practically no wilt occurred; this temperature was the lower limit for the most rapid growth of watermelon plants.

Further investigations by A. S. Rhoads demonstrated 82 different species of plants, including a wide variety of fruit, forest, and ornamental trees, shrubs, and vines to be attacked by *Clitocybe tabescens* [ibid., iv, p. 585; xii, p. 680]. Comparison of the fungus with numerous isolations of *Armillaria mellea* from different countries showed that although the rhizomorphs of both organisms are very similar the mycelial growth characters are quite different. Further, the mycelium of *A. mellea* and *A. fuscipes* [ibid., x, p. 525] is generally phosphorescent in the dark, a character absent from the many cultures of *C. tabescens* examined.

Studies by W. B. Tisdale and E. West on stem-end rot of stored citrus fruits due to *Diplodia natalensis* [ibid., xiii, p. 26; xiv, p. 30] showed that the optimum temperature for infection and decay was between 26° and 29°, this temperature coinciding with the optimum for growth of the fungus in culture. At this temperature decay became apparent five days after the spores had been placed on freshly cut ends of the buttons. No decay developed from similar inoculations in 18 days at 13° or 40°. Spraying in the grove had a direct effect on the percentage of fruit decay that developed in storage. In one experiment, pineapple oranges from unsprayed control trees developed 68 per cent. total decay, 27 per cent. of which was due to *D. natalensis*, the corresponding figures for the fruit from trees sprayed with colloidal sulphur and lime-sulphur plus lime being, respectively, 39 per cent. and 12 per cent., and 55 per cent. and 17 per cent. Valencia oranges similarly treated showed smaller differences in the percentages of decay.

W. B. Tisdale and S. Hawkins state that during the past two years growers in the lower east coast section of Florida have sustained heavy losses from a trunk-girdling disease of limes [*Citrus medica*] caused by a *Diplodia* and another fungus.

G. F. Weber found that loss of fruit in citrus groves was caused by *Nematospora coryli* [ibid., xiii, p. 337], consignments of tomatoes also showing up to 4 per cent. infection. Inoculation tests showed that *N. gossypii* developed less rapidly than *N. coryli* and caused less rapid decay than the latter both in tomatoes and citrus fruit.

Müller (A. S.). **Brazil: preliminary list of diseases of plants in the State of Minas Geraes.**—*Internat. Bull. of Plant Protect.*, viii, 9, pp. 193–198, 1934.

Among the diseases affecting economic crops in the State of Minas Geraes, Brazil, may be mentioned *Macrosporium nigricans* [*R.A.M.*, ix, p. 489] and *Verticillium albo-atrum* on cotton [ibid., xiii, p. 632]; *Cercospora cordobensis*, *Phyllosticta batatas* [ibid., x, p. 268; xii, p. 553], and *Monilochaetes infuscans* on sweet potato; *C. solanicola* [ibid., ix, p. 227] on potato; *C. longipes* on sugar-cane [ibid., xii, pp. 39, 467]; *C. cruenta* on cowpea [ibid., xii, p. 725]; *C. canescens* [ibid., xi, pp. 130, 431] and *C. columnaris* [*Isariopsis griseola*: ibid., xii, pp. 2, 680] on beans (*Phaseolus vulgaris*); *Bacterium sojae* on soy-bean [see above, p. 78]; *Bact. tabacum* on tobacco; *Clasterosporium müllerii* on sunflower (*Helianthus annuus*); *Oidium manihotis* Averna-Saccá on *Manihot* spp.; *Cercospora grandissima* [ibid., vii, p. 765] on artichoke (*Cynara scolymus*); *Aplanobacter* [*Bacterium*] *stizolobii* on *Stizolobium deeringianum* [ibid., vii, p. 642]; *Phytophthora parasitica* on peas; *Bacterium pruni* on peach and other species of *Prunus* [ibid., xiii, p. 564]; and *Phoma uvicola* [*Guignardia bidwellii*: ibid., iii, p. 746] on *Vitis* spp.

Butler (E. J.). **Note on the incidence of Cacao diseases in the British Colonial Empire and the steps being taken to investigate and control them.**—*Bull. Officiel, Office Internat. des Fabric. de Chocolat et de Cacao*, iv, 3, pp. 121–125, 1934. [French translation.]

Short, popular notes are given briefly reviewing (with reference to some of the more important papers on the subject) the present situation as regards the prevalence, relative importance, and control of the cacao diseases found in the British Empire, viz., canker and black pod (*Phytophthora palmivora*) [*R.A.M.*, xi, p. 701]; witches' broom (*Marasmius perniciosus*) [ibid., xiii, p. 359]; black root (*Rosellinia* spp.) [see above, p. 84]; *Fomes* root diseases caused by *F. lignosus*, *F. noxius*, and possibly other species of this genus; red root (*Sphaerostilbe repens*); collar crack (*Armillaria mellea*) [ibid., vi, p. 659]; collar rot (*Ustulina zonata*); pink disease (*Corticium salmonicolor*); die-back and brown pod rot (*Botryodiplodia theobromae*), considered to be usually secondary to *P. palmivora* or some other primary trouble; mealy pod (*Trachysphaera fructigena*) [ibid., xi, p. 701]; minor leaf and twig diseases due to *M. scandens*, *M. byssicola*, *C. koleroga*, *Cephaleuros parasiticus* and *C. minimus*; and mould damage produced on the beans in fermenting and transit [ibid., xiv, p. 14].

Bouriquet (G.). **La culture du Blé à Madagascar et les rouilles.** [Wheat-growing in Madagascar and the rusts.]—*Agron. Colon.*, xxiii, 200, pp. 40–46; 201, pp. 77–80, 1 pl., 1934.

The author states that in Madagascar wheat is attacked, in some years with great severity, by the rusts *Puccinia triticina*, *P. graminis*, and *P. glumarum*, the relative importance of which in the island has not yet been determined. Control measures are briefly considered, among which improved cultural methods appear to be the most promising.

Klemm (M). **Schwarzrostauftreten in Deutschland und Südosteuropa im Jahre 1932.** [The occurrence of black rust in Germany and south-east Europe in the year 1932.]—*Landw. Jahrb.*, lxxx, 2, pp. 333–351, 2 graphs, 2 maps, 1934.

This is an expanded and tabulated account of the black rust of wheat [*Puccinia graminis*] epidemics in south-eastern Europe and Germany in 1932, the essential features of which have already been noticed from other sources [*R.A.M.*, xiii, pp. 152, 501]. In East Prussia and Silesia the reduction of yield from the disease is stated to have represented a financial loss of M. 38,000,000. The heaviest damage occurred on late maturing varieties and in stands receiving copious applications of nitrogen.

Lehmann (E.), Bader (A.), Mittmann (Gertrud), & Schnitzler (O.). **Berberitzenverbreitung und Schwarzrostauftreten in Württemberg.** [Barberry distribution and the occurrence of black rust in Württemberg.]—*Landw. Jahrb.*, lxxx, 1, pp. 1–37, 3 figs., 1 diag., 5 maps, 1934.

During the summer of 1933, black rust [*Puccinia graminis*] was observed in every wheat, spelt, and rye field examined in Württemberg, often on each plant. Barberries clearly acted as foci of infection, especially in the Ulm district, in certain areas of which the wheat and spelt plants were literally covered with pustules near the alternate host. The further the distance from barberries, the slighter was the attack. During the hot, dry period later in the summer, secondary spread by the uredospores was limited, a fact that rendered the contrast between the barberry centres and the areas outside their influence all the more striking.

Johnston (C. O.). **The effect of mildew infection on the response of Wheat-leaf tissues normally resistant to leaf rust.**—*Phytopath.*, xxiv, 9, pp. 1045–1046, 1 fig., 1934.

Warden (C.I. 4994) wheat in Kansas attacked by mildew (*Erysiphe graminis*) was found to lose its normal resistance to leaf rust (*Puccinia triticina* form 9) [*R.A.M.*, xiii, p. 431], presumably as a result of the splitting by the former of certain complex compounds, ordinarily unavailable to the latter, into simpler ones that may readily be utilized.

Churchward (J. G.). **A note on the occurrence of seedling lesions caused by cereal smuts.**—*Proc. Linn. Soc. New South Wales*, lix, 3–4, pp. 197–199, 1 pl., 1934.

When seed-grain of reputedly resistant and susceptible varieties of wheat and oats was inoculated with the spores of *Urocystis tritici*, *Tilletia tritici* [*T. caries*], and *Ustilago avenae*, well-defined, white, opaque spots developed on the coleoptile and first leaf of all the varieties, Algerian oats infected by *U. avenae* also showing very marked distortion [cf. *R.A.M.*, xiii, p. 623].

Sections through the spots showed the presence of two kinds of smut mycelium, one of which was deeply stained and associated with the vascular tissue, while the second, which was less abundant and less

stained, and apparently originated from the former, grew out towards the periphery at right angles to the axis of the coleoptile. The nuclei, which were seen only in the deeply stained mycelium, were in the dikaryophase.

The white, leprous spots, though not a criterion of resistance or susceptibility to smut, are better indicators of infection than is distortion, inasmuch as while all the plants of several varieties were spotted, by no means all showed distortion.

ANGELL (H. R.). **Flag smut of Wheat—early symptoms.**—*Journ. Australian Council Sci. & Indus. Res.*, vii, 3, pp. 153–156, 1934.

As already reported [*R.A.M.*, xiii, p. 623] experiments conducted at Canberra showed that when wheat seed inoculated with flag smut [*Urocystis tritici*] was sown at depths not greater than 1½ in. and germinated in darkness at about 20° C. most of the infected seedlings were distinguishable from the healthy ones by pronounced distortion. In the cold season, when under greenhouse conditions the coleoptiles remained alive for about two weeks, the infected plants were clearly distinguishable by the presence of leprous spots [see preceding abstract].

Judged by the coleoptile symptoms all the wheat varieties tested were about equally susceptible, but as the usual foliar symptoms may not appear on all the infected plants a variety may be regarded as resistant if on a majority of individual plants spores are not produced.

Seed-borne infection was experimentally controlled (in clean soil) by dusting with tillantin R [ibid., x, p. 371].

OORT (A. J. P.). **Een nieuwe methode ter bestrijding van Tarwestuifbrand (Ustilago tritici).** [A new method of combating loose smut of Wheat (*Ustilago tritici*).]—*Tijdschr. over Plantenziekten*, xl, 9, pp. 185–197, 1 graph, 1934. [English summary.]

Full details are given of experiments to determine the minimum quantity of water necessary for the disinfection against *Ustilago tritici* of Juliana wheat seed-grain moistened in water-tight containers revolving in a water bath at constant temperature [*R.A.M.*, xiii, p. 750]. The effects of 10, 15, and 20 l. of fluid per 100 kg. of seed-grain were tested at 40°, 45°, and 50° C. It was found that at 45° complete freedom from smut was obtained by five to six hours' treatment with 20 l. of water, while at 50°, using the same quantity of liquid, identical results were secured in one hour; with only 10 l. of water three to four hours are requisite for absolute control at 50°. The addition of 3 or 5 per cent. denatured alcohol, as recommended by Gassner [loc. cit.], considerably accelerated disinfection at 40° and 45° but not appreciably at 50°; furthermore, the germination of the seed-grain when alcohol was used was progressively impaired with an increase in the alcohol content and the amount of fluid used, and with a rising temperature, so that this addition is inadvisable.

BRACKEN (A. F.). **Effect of various smut treatments on yield of winter Wheat.**—***Journ.** Amer. Soc. Agron.*, xxvi, 9, pp. 748–751, 1934.

In a ten-year test to determine the effect of various seed treatments against smut [***Tilletia caries*** and ***T. foetens***] on the yield of winter wheat

in Utah, it was found that the average outputs per acre were as follows: untreated 24·7 bushels, copper carbonate 24·8, copper sulphate 23·4, and formalin 21·8. In most cases autumn sowing was associated with a reduction of yield for the liquid treatments. The injury caused by copper sulphate was uniform on all plots, whereas formalin was responsible for irregular patches in the stand.

Hermann (S.) & Neiger (R.). **Untersuchungen über die fungizide Wirkung von Salicylsäure und Salicylsäureverbindungen auf Tilletia tritici.** [Investigations on the fungicidal action of salicylic acid and salicylic acid compounds on *Tilletia tritici*.]—*Zentralbl. für Bakt.*, Ab. 2, xc, 9-13, pp. 258-267, 1934.

A tabulated account is given of the results of the writers' laboratory experiments [the technique of which is indicated] at Prague, Czecho-Slovakia, on the action of salicylic acid and some of its compounds on the spores of wheat bunt (*Tilletia tritici*) [*T. caries*].

Free salicylic acid was fungicidal at a concentration as low as 0·05 per cent., but sodium or calcium salicylate only at 4 or 6 per cent. (30 minutes' immersion). None of the other alkali or alkali earth salicylates tested exercised any fungicidal action within the same period. Evidently, therefore, the anion and the duration of treatment are the determining factors in the fungicidal efficacy of the salicylates. The spores of *T. caries* are completely inactivated by the water-soluble heavy metal salicylates (copper, iron, zinc, cadmium, and lead) at concentrations up to 0·5 per cent., but the effect is temporary and readily removed by washing out the disinfectant with n/10 sodium lye followed by n 10 hydrochloric acid and then water. Suspensions of lead, basic copper, or mercuric oxide salicylates (a mixture of 0·01 to 0·1 gm. of the fungicide and 0·1 gm. of spores shaken up together for 30 minutes and then filtered) proved definitely fungicidal as indicated by subsequent germination tests on the washed spores in a 0·25 per cent. calcium nitrate solution. But the filtrates of 0·5 per cent. lead or mercuric oxide salicylate suspensions had a purely temporary fungicidal effect, which was removed by washing out the fungicide.

Laboratory and field germination tests were undertaken with bunt-infected wheat seed-grain treated with 'hajkol' dust (Chem. Fabrik B. Hájek G.m.b.H., Prag-Premyslení), the active component of which is basic copper salicylate. When the preparation was used at a strength of 0·08 per cent. only isolated spores germinated on damp soil in the laboratory, while at 0·1 per cent. no germination occurred. A completely healthy stand developed in the field from inoculated seed-grain treated with 0·1 to 1 per cent. hajkol, the general vigour of the plants pointing to a stimulatory effect of the disinfectant.

Mitra (M.). **A leaf spot disease of Wheat caused by Helminthosporium tritici-repentis Died.**—*Indian Journ. Agric. Sci.*, iv, 4, pp. 692-700. 3 figs., 1934.

This is a brief account of the author's studies of the species of *Helminthosporium* which was stated in a previous report to be very prevalent on wheat in Pusa [*R.A.M.*, x, p. 437] and which has since been identified as a strain of *H. tritici-repentis*, the common host of which is *Agropyron*

repens [ibid., xi, p. 695]. On wheat the fungus usually occurs in association with *H. sativum*, from which it cannot be easily distinguished by external symptoms, and in some years considerable damage is done by it to the crop. Its parasitism on wheat was established by a number of inoculation experiments, while further experiments showed that the fungus from wheat could infect *A. repens* and produce symptoms on this host similar to those described by Drechsler [ibid., iii, p. 65].

Conidiophores and conidia were not formed in cultures on synthetic media but developed on sterilized straw, on which sclerotia were also produced. The latter are furnished with setae and in a few cases developed into perithecia with asci and ascospores of the *Pyrenophora* type.

Laumont (P.) & Murat (M.). **Observations sur la moucheture et la mauvaise germination de quelques Blés en 1933.** [Observations on 'moucheture' and the poor germination of certain Wheats in 1933.] —*Bull. Soc. Hist. Nat. Afrique du Nord*, xxv, 7, pp. 253-265, 1 pl., 1934.

The experiments briefly described in this paper were made to determine whether a correlation existed between the fairly high percentage of 'moucheture' [*R.A.M.*, xii, p. 160; xiii, p. 22] in the seed-grain of certain wheats sown in 1933 and their poor germination in the region of Maison-Carrée [Algeria]. When germinated in the laboratory, superficially disinfected grains of local and imported wheats, whether outwardly clean or exhibiting 'moucheture', all yielded the same fungi in culture, namely, species of *Alternaria*, *Cladosporium*, and *Macrosporium*, and occasionally some perithecia of *Pleospora*, the *Alternaria* sp. being present in over 90 per cent. of the grain, whether 'moucheté' or not. This would indicate, in the authors' opinion, that the *Alternaria* is not the direct cause of 'moucheture'. In all the grains tested, however, a high mortality was observed to be due to bacterial rots which have not been identified, as well as to intensely black rots of the plumule or of the radicle, or of both organs simultaneously.

Microscopical examination of clean and affected grains belonging to a number of wheat varieties of different origins showed the almost constant presence in their external integuments of a mycelium which in culture usually produced a species of *Alternaria*, believed to be *A. peglionii* [ibid., xiii, p. 21], with an occasional admixture of *Cladosporium* and *Macrosporium*, considered to be due to accidental contamination. *Helminthosporium sativum* has never been found on wheat in Algeria.

Field observations and some laboratory work would tend to confirm L. Ducellier's suggestion (*Bull. Soc. Agron. Alg.*, 1929) that 'moucheture' in Algeria is due to the activity of a species of *Thrips* which, besides causing direct injury to the crop, infects the developing grains with various parasitic fungi and bacteria which may cause a rotting of the germinating seeds. It was also noticed that a proportion of the 1933 wheat seed-grain was either broken or slightly split in the region of the embryo, where it exhibited a livid, lead-coloured discoloration. Such seed never germinated, and was shown to be invaded by *Aspergillus repens* [*R.A.M.*, xii, pp. 149, 535], the perfect stage of which (*Eurotium*

repens) was occasionally found in the ventral groove of the grains or on the germ.

Honecker (L.). **Über die Modifizierbarkeit des Befalles und das Auftreten verschiedener physiologischer Formen beim Mehltau der Gerste, Erysiphe graminis hordei Marchal.** [On the tendency to modification of infection and the occurrence of various physiologic forms in Barley mildew, *Erysiphe graminis hordei* Marchal.]—*Zeitschr. für Züchtung*, A, xix, 4, pp. 577–602, 2 figs., 1934.

Continuing his observations at Weihenstephan, Bavaria, on the relation of environmental conditions to barley mildew (*Erysiphe graminis hordei*) [*R.A.M.*, xi, p. 101; see also xiv, p. 25], the writer found that the intensity of infection, particularly of the medium types, is liable to considerable modification by external factors. Thus, the plants kept under conditions adversely affecting assimilation, e.g., either an excess or deficiency of warmth and light, showed a measurable reduction of resistance to the fungus. The mode of inheritance of resistance is also susceptible of alteration through external influence. At 15° to 25° C. in diffuse light resistance is inherited as a recessive character, whereas at 25° to 35° in strong, direct light great susceptibility is recessive and moderate resistance dominant. These facts are considered to demonstrate the need for uniform laboratory conditions in studies on physiologic specialization and inheritance, the results of which are not necessarily applicable in all particulars to field plants.

Two physiologic forms of *E. graminis hordei* have been found to occur in south Germany, namely, A, with a very limited host range among the barley varieties tested, and B, with a wider one including all the varieties affected by A. Recent investigations have shown that form A is widespread throughout Germany, whereas the ratio of B to A is constantly decreasing except in localities where varieties resistant to A and susceptible only to B are cultivated. It is desirable, therefore, in analytical studies of biotypes, not only of *E. graminis* but of fungi in general, to cultivate some more or less resistant varieties from outside sources in addition to the local commercial sorts in order to promote the possible development of new or hitherto obscure physiologic forms.

Inoculation experiments with forms A and B on a large number of barley varieties led to the establishment (on the usual basis) of a sliding scale of resistance. Three varieties are proposed as a standard for use in inoculation experiments with collections of *E. graminis* on barley from different sources, i.e., Ackermanns Isaria, representing the largest group, highly susceptible to both A and B; Weihenstephan CP 127/422, immune from A but highly susceptible to B; and Dalmatian Ragusa, immune from both forms.

Several years' observations have shown that winter barley, as the bearer of the conidial stage of *E. graminis*, is responsible for the early mildew epidemics on the summer varieties [ibid., xiii, p. 626] in south Bavaria. On winter barley in the open only form A has hitherto been detected, form B being possibly dependent for perpetuation on the perithecial stage, in which case its sporadic and uncertain occurrence is readily explicable.

Mand. **Roggen-'Auswinterung' infolge Stock-Krankheit.** [Winter injury of Rye due to 'stock' disease.]—*Deutsche Landw. Presse*, lxi, 37, p. 460, 1934.

Typhula graminum was found causing secondary infection on rye plants attacked by the stem nematode [*Anguillulina dipsaci* (Steinb.) Gerv. & v.Ben.] in Germany [cf. *R.A.M.*, x, p. 235].

Küssner (W.). **Ergoclavin, ein neues spezifisches Alkaloid des Mutterkorns.** [Ergoclavin, a new specific alkaloid of ergot of Rye.]—*Arch. Pharm. u. Ber. Deutsch. Pharm. Gesellsch.*, clxxii (xliv), 3, pp. 503–504, 1934.

Full details are given of a hitherto unrecognized alkaloid isolated (by Barger's and Carr's method for ergotoxin, *Journ. Chem. Soc.*, p. 337, 1907) from Spanish, Russian, and Hungarian samples of ergot of rye [*Claviceps purpurea*: cf. *R.A.M.*, xi, p. 446], to which the name ergoclavin is given. The new substance is stated to exert the same specific action as ergotoxin.

Wellman (F. L.). **Infection of Zea mays and various other Gramineae by the Celery virus in Florida.**—*Phytopath.*, xxiv, pp. 1035–1037, 1 fig., 1934.

Some two-thirds of the hundreds of maize plants inoculated under greenhouse conditions in Florida with celery virus 1 [*R.A.M.*, xiv, p. 4, and below, p. 112] by means of *Aphis gossypii* from diseased *Commelina nudiflora* and celery contracted infection. Teosinte (*Euchlaena mexicana*), sorghum, wheat, and rye seedlings were also successfully infected with the same virus. In greenhouse trials there was little difference in susceptibility between the sweet, pop, flint, and dent varieties of maize. Several maize varieties were also found spontaneously affected by the celery virus in the field. Juices from diseased maize plants produced typical celery virus lesions on cucumber cotyledons and the usual systemic symptoms on cucumber and celery.

The incubation period of the celery virus disease on maize ranged from 3 to 20 days, infection being most rapid and severe at temperatures of 70° to 90° F., when 15 to 20 viruliferous aphids were placed on the seedlings three to five days after emergence from the soil. The systemic symptoms were faintly discernible eight days after inoculation, and four days later they were distinct. Striping and stunting were marked after the plants had been diseased for three or four weeks.

The celery virus causes a stripe disease of maize in Florida very similar to (but not identical with) the white stripe of the latter crop in Cuba [ibid., xi, p. 591; xii, p. 756], differing especially in the absence of severe rosette and crook-neck symptoms. On a recent visit to Cuba, the writer observed the typical celery virus 1 symptoms on celery, squash, cucumber, *C. nudiflora*, *C. communis*, pepper [*Capsicum annuum*], sweet potato, and tomato. This virus was found to be transmissible in Florida by aphids but not by *Peregrinus maidis*, the vector of Cuban white stripe. It often causes chlorotic patterns on maize similar to those produced by the sugar-cane mosaic virus on the same host [ibid., ix, pp. 300, 560, 724], while an occasional darkening of the fibrovascular

bundles in the celery virus-infected plants is suggestive of the Hawaiian maize mosaic described by Kunkel [ibid., i, p. 194]. At an advanced stage the striping of the foliage due to the celery virus is more translucent than that associated with Cuban white stripe, with distinct demarcation between the green and chlorotic areas. Leaf-splitting and crumpling of the leaf tips may be present in the former disturbance, which is further characterized by *moiré* mottling of the first systemically infected leaves and by buff-coloured and necrotic lesions on old, heavily infected foliage.

Elliott (Charlotte) & Poos (F. W.). **Overwintering of Aplanobacter stewarti.**—*Science*, N.S., lxxx, 2074, pp. 289–290, 1934.

Aplanobacter stewarti, the agent of bacterial wilt of maize in the United States [*R.A.M.*, xiii, p. 571], has been found in recent experiments in Virginia to overwinter in the flea-beetle, *Chaetocnema pulicaria* Melsh. Healthy maize plants in the greenhouse were successfully inoculated with the organism recovered from the surface-sterilized insects macerated in beef broth. *A. stewarti* is known to overwinter to a limited extent in infected seed, but there is no direct evidence of its perpetuation in naturally infected field soil. It is considered probable, therefore, that *C. pulicaria*, and possibly other insects, may largely assist in carrying the pathogen over the winter.

Walter (J. M.). **The mode of entrance of Ustilago zeae into Corn.**—*Phytopath.*, xxiv, 9, pp. 1012–1020, 2 figs., 1934.

The examination of fixed and stained material of the Rustler, Pickaninny, and Golden Bantam maize varieties inoculated in Minnesota with single and combined monosporidial lines and spore suspensions of *Ustilago zeae* showed that the fungus enters the host by direct penetration through the epidermis of young cells. The smut spores as well as the sporidia may emit germ-tubes capable of direct entry into the host. Attention has been drawn by previous workers to the occurrence of necrotic symptoms [*R.A.M.*, viii, p. 563] in maize smut, this type of response to inoculation being very probably a manifestation of hypersensitiveness and possibly correlated with a high degree of host resistance to the disease. It is mentioned that the estimated annual loss from maize smut in the United States amounts to 2 per cent. of the crop or about 55,000,000 bushels.

Rands (R. D.) & Dopp (E.). **Variability in Pythium arrhenomanes in relation to root rot of Sugarcane and Corn.**—*Journ. Agric. Res.*, xlix, 3, pp. 189–221, 3 figs., 9 graphs, 1934.

Considerable details are given of laboratory and greenhouse experiments, in which the authors studied the variability of *Pythium arrhenomanes* [*R.A.M.*, xiii, p. 117], considered to be probably the most important of the fungi associated with root rot of sugar-cane in the United States [ibid., ix, p. 809]. Besides isolations from Louisiana and Florida, the material investigated (comprising 70 isolates) included a strain of Carpenter's from sugar-cane in Hawaii [ibid., xiii, p. 471], another from

the same host in Mauritius, various strains from maize root rot in the North-Central American States, the cereal root browning strain from Canada [ibid., xi, p. 434], and nine of the forms of *Nematosporangium* recently described by Sideris, namely, *N. arrhenomanes* and the eight new 'species' recorded by him in 1931 [ibid., xi, p. 129]. The results of oogonial measurements, cultural studies, and infection experiments [which are tabulated] showed that the strains differed widely in the size of the oogonia, the number of antheridia (often 4 to 10), rate of growth in culture, response to variations in temperature and hydrogen-ion concentration of the medium, and in virulence on the different local varieties of sugar-cane and maize. However, enough intermediate or overlapping forms were seen to indicate the inadvisability, for the present at least, of subdividing the species, especially because of certain constant and distinctive characteristics of the sexual organs such as the typical crook-necked antheridium and the remote connexion between male and female organs. For these reasons Sideris's nine forms of *Nematosporangium*, mainly from pineapple in Hawaii, are all referred to *P. arrhenomanes*. It is suggested that the diversity of forms observed may be due to hybridization between various strains, which would be particularly favoured by the diclinous relationship of antheridia and oogonia.

Physiologic specialization in *P. arrhenomanes* was indicated by the fact that the strains isolated from sugar-cane exhibited greater tolerance to high temperatures than the American strains from maize, and particularly by the wide differences in virulence between representatives of each group to both hosts. The results of preliminary field observations and infection studies now in progress in Louisiana would indicate an increase in population of the more virulent strains on sugar-cane, at least in so far as this concerns the Louisiana Purple variety, since the replacement of this variety and D–74 by more productive types.

It is evident that in breeding sugar-cane varieties resistant to the fungus, special attention should be given to differences in virulence and geographic distribution of strains of the latter. Possible specialization and multiplication of destructive physiologic strains of *P. arrhenomanes* should be retarded by the use of apparently resistant varieties, which should be successively rotated, as far as practicable, on the different fields of a plantation.

Myers (H. E.). **Effect of chemical soil treatments on the root, crown, and shoot rot of Milo.**—*Journ. Amer. Soc. Agron.*, xxvi, 9, pp. 737–739, 1 fig., 1934.

In an attempt to combat the root, crown, and shoot rot of dwarf yellow milo sorghums [*R.A.M.*, xi, p. 507] in Kansas by various soil treatments, encouraging though not fully satisfactory results were obtained by the application of ammonium nitrate at the rate of 200 lb. per acre and of sodium nitrate and ammonium sulphate (300 lb. each). That the disturbance is not directly due to the alkalinity of the soil was shown by the failure of the plants to respond to sulphur and sulphuric acid fertilizers. The micro-organism which is evidently associated with the rot appears to exert some influence on the nitrogen nutrition of the crop.

Citrus Experiment Station.—*Ann. Rept. Florida Agric. Exper. Stat. for the fiscal year ending June 30, 1933*, pp. 137–151, [1934].

G. D. Ruehle and W. A. Kuntz state that further studies on citrus melanose [*Diaporthe citri*: *R.A.M.*, xii, p. 495] indicated that, in addition to the second species of *Diaporthe* already reported [loc cit.], there is a third species of the same genus, found on decaying citrus wood in Florida, and sometimes associated with the production of stem-end rot. It has larger asci and ascospores than *D. citri* and in culture on certain media grows less rapidly. Inoculation tests demonstrated that it produces typical melanose lesions on grapefruit leaves and stem-end rot on orange fruits. In spraying tests on grapefruit and oranges Bordeaux mixture was the only fungicide which consistently gave even partial commercial control of melanose [ibid., xiii, p. 763].

Putterill (V. A.) & Davies (R.). **Citrus wastage investigations carried out at Zebediela, Transvaal, during the seasons 1931 and 1932.**—*S. Africa Dept. of Agric. Bull.* 128, 49 pp., 1934.

A comprehensive account is given of packing tests carried out in 1931–2 at Zebediela, Transvaal, to test the bearing of various pre-storage factors on the keeping qualities of Navel oranges during transit to Cape Town and to England [cf. *R.A.M.*, xiii, pp. 504, 763]. The results [which are discussed and tabulated] indicated that wastage due to green mould [*Penicillium digitatum*] decreased as the season advanced. In both years the wastage in the fruit picked and packed under the supervision of officers of the Department of Agriculture was reduced approximately to half of that which developed in fruit handled by the staff at the Zebediela Estates packing house, presumably owing to the better methods of handling employed by the Departmental officers. Packing the fruit on the day of picking tended to keep it in better condition than packing after wilting for ten days. The tests also confirmed the advantage for controlling green mould of washing the oranges before packing in a 3 per cent. sodium bicarbonate solution. No appreciable improvement in the condition of the shipped fruit was noticed from the modifications that have been made in the railway trucks. The lugboxes, into which the fruit is picked for transport to the packing house, should be disinfected before use, and experiments showed that mould was diminished by using a layer of woodwool on the bottom of the boxes to prevent injury from abrasion during the early part of the season. Control of insects such as fruit fly, which lead to the development of mould infection in the grove, is considered to be essential in eliminating waste caused by mould fungi.

Massey (R. E.). **Angular leaf spot and blackarm of Cotton caused by B. malvacearum E.F.S.**—*Rept. Second Conf. Cotton Growing Problems, 1934*, pp. 175–178, London, Empire Cotton Growing Corporation, 1934.

In this account of cotton angular leaf spot and blackarm (*Bacterium malvacearum*) in the Sudan the author gives notes on the causal organism, absence of alternate hosts locally, sources of infection, transmission, incubation period, conditions necessary for infection, and control. Most

of the experimental results mentioned have been noticed previously [cf. *R.A.M.*, xiii, p. 765].

HANSFORD (C. G.). **Blackarm disease in Uganda.**—*Rept. Second Conf. Cotton Growing Problems, 1934*, pp. 178–185, London, Empire Cotton Growing Corporation, 1934.

In this account of cotton blackarm [*Bacterium malvacearum*: see preceding abstract] in Uganda [see above, p. 82] notes are given on the prevalence and geographical distribution of the disease locally since 1922, the origin of the stem lesions, spread, the pathology of stem and branch infections, effect of the disease on the crop, seasonal carry-over, and varietal resistance.

The paper was followed by a discussion (pp. 186–195) including an account by H. R. Hosking on the progress made in Uganda in the selection of resistant varieties.

PEARSON (E. O.). **Investigations on Cotton stainers and internal boll disease.**—*Rept. Second Conf. Cotton Growing Problems, 1934*, pp. 146–155, London, Empire Cotton Growing Corporation, 1934.

Investigations conducted in the Transvaal into the part played by insects in cotton internal boll disease indicated that early in the season, when conditions are more humid than later on, staining is largely due to bacteria which are present on the surface of the boll, and subsequently enter the latter through insect punctures. Later on staining is chiefly due to *Nematospora gossypii* and *N. coryli* [*R.A.M.*, xiii, p. 368]; both were isolated from affected bolls, the former more frequently than the latter. By caging adult stainers (*Dysdercus* spp.) collected in the field, on sterile bolls it was shown that *D. nigrofasciatus*, *D. intermedius*, and *D. fasciatus* were all able to transmit *N. gossypii*. Adults of *D. nigrofasciatus* collected from wild cotton and *Hibiscus vitifolius* in November and December and from *H.* sp. in January were all found to carry *N. gossypii*, whence it appears that migrants to the crop are already infected with *Nematospora*.

Inoculations of sterile bolls hypodermically with spore suspensions of *Nematospora* demonstrated that infection spreads more rapidly in bolls which have ceased rapid growth and in which the lint is thickening than in young, rapidly growing bolls or older ones beginning to dry out. Staining is due to the coagulation and post-mortem discoloration of the protoplasmic contents of the lumen of the lint hair. This explains why in older bolls, where vacuolation of the lint hair has occurred, there is less staining than in younger ones.

During early infection by *N. coryli*, when the fungus is present as short hyphal lengths and immature sporangia, the staining is more or less confined to the part occupied by the fungus, whereas with *N. gossypii* the effect of the fungus extends far beyond the region where it is found (the immediate neighbourhood of a puncture), and there is extensive breakdown and matting of the lint, which is eventually reduced to a papery membrane closely adpressed to the seed surfaces and forming a kidney-shaped loculus.

The extension of the staining beyond the region occupied by the fungus suggests that the death of the lint hairs is due to a toxin liberated

by *Nematospora*. Bolls inoculated with sterilized, centrifuged suspensions of pure cultures of each species developed staining indistinguishable from that produced by the living organism. This was very much more marked with the toxic solution prepared from *N. gossypii* than with that from *N. coryli*.

Anson (R. R.). **Leaf curl disease of Cotton in the Fiji Islands.**—*Rept. Second Conf. Cotton Growing Problems, 1934*, pp. 195–196, London, Empire Cotton Growing Corporation, 1934.

In 1931–2 and again in 1933 a few plants at the Cotton Experiment Station, Fiji, developed a disease, not previously noted in the island, characterized by leaf curling. A short account is given of the condition. In the discussion on this paper (pp. 196–198) it was suggested that judging from the symptoms the disease did not appear to be the same as leaf roll in Nigeria [*R.A.M.*, vi, p. 162] or the virus leaf curl found in the Sudan [ibid., xiii, p. 697].

Marchionatto (J. B.). **Algunos hongos entomógenos comunes en la República Argentina y las posibilidades de su aplicación agrícola.** [Some entomogenous fungi common in the Argentine Republic and the possibilities of their agricultural application.]—*Rev. Fac. Agron. y Vet.*, Buenos Aires, vii, 3, pp. 571–584, 8 figs., 1934.

Geographical, morphological, cultural, and taxonomic notes are given on the following fungi parasitic on insects in the Argentine Republic and on their potentialities as instruments of control in the field: *Sporotrichum globuliferum* and *S. paranense* on *Schistocerca paranensis* [*R.A.M.*, xiii, p. 766, and next abstract], *Dirphia lauta, Oeceticus geyeri*, and *Phesia nu* (in inoculation tests also on *Colias lesbia*); *Cephalosporium lecanii* [ibid., ix, p. 33] on *Mesolecanium deltae, Lecanium persicae*, and *Saissetia oleae*; *Podonectria coccicola* [ibid., vi, pp. 145, 419] on *Lepidosaphes beckii*; *Peziotrichum saccardinum* Rangel on *Aspidiotus perniciosus*; *Myriangium duriaei* on *A. perniciosus* and *Chrysomphalus aurantii*; and *Sphaerostilbe coccophila* [ibid., xiii, p. 698] on *C. aurantii*.

P. saccardinum forms a dense, black mycelium on *A. perniciosus*, the insects becoming completely encrusted by the solid weft, which may extend all round the branches of the host (pear). The conidiophores formed on the mycelial stratum are dark-coloured, irregularly cylindrical, simple or sparsely branched, and denticulate at the apex on which are borne globose, smooth, hyaline (later smoky) conidia, 9 to 11 μ in diameter.

Directions (based on information supplied by E. W. Berger of the Florida Plant Board regarding the natural control of insects by *Aschersonia aleyrodis* and *A. flavocitrina* [loc. cit.]) are given for the use of the fungi under discussion against insect pests of fruit trees in the orchard.

McMartin (A.). **The locust fungus. Its artificial cultivation.**—*South African Sugar Journ.*, xviii, 9, pp. 521, 523, 1934.

After repeated attempts to cultivate the locust [*Nomadacris septemfasciata*] fungus (*Empusa grylli*) from newly dead insects [*R.A.M.*, xiii, p. 699], cultures were eventually obtained on a liquid medium consisting of maltose, glycerine, and peptone. A genetic connexion was traced

between the yeast-like bodies representing the early stages of infection in the locusts [cf. ibid., vi, p. 481] and the conidial stage. As the fungus is not an obligate parasite there is a possibility that it may persist on dead organic material or on the leaves to which masses of conidia adhere after the dead locust falls off.

Brief notes are given on three other fungi parasitic on locusts in South Africa, viz., a green *Sporotrichum* in all probability identical with the Argentinian *S. paranense* [see preceding abstract], *S. globuliferum*, and *Fusarium acridiorum* [*R.A.M.*, xiii, p. 439].

Drechsler (C.). **Pedilospora dactylopaga n.sp., a fungus capturing and consuming testaceous rhizopods.**—*Journ. Washington Acad. Sci.*, xxiv, 9, pp. 395–402, 1 fig., 1934.

Latin and English diagnoses, supplemented by a full discussion of the morphology and taxonomy of the organism, are given of *Pedilospora dactylopaga* n.sp., found capturing and consuming the testaceous rhizopods, *Difflugia globulosa* and *Trinema enchelys*, in agar plate cultures from decaying rootlets collected at Washington, D.C. Attention is drawn to the close relationship between the fungus under observation and the previously described species of *Arthrobotrys* and *Monacrosporium* parasitic on nematodes [*R.A.M.*, xiii, p. 509]. The protozoa are captured by *P. dactylopaga* with the aid of digitate or elongate-elliptical, apparently adhesive protuberances arising at intervals of 15 to 20 μ from the hyaline, septate hyphae, 1·2 to 2·2 μ in width, and also formed on detached conidia. From these a branch grows out and penetrates into the host cell. The few sparsely septate, hyaline, fairly erect conidiophores measure 75 to 125 by 2 to 3 μ (basal diameter) and bear at their apices solitary, bi- (occasionally tri-) lobate-furcate, hyaline, 4- to 10-, usually 7-septate conidia, 20 to 40 (mostly 30) μ in length, the lobes parallel to or slightly divergent from one another and generally consisting of 2 to 4 (typically 3) cells in linear arrangement.

Redaelli (P.) & Ciferri (R.). **Gilchristia dermatitidis (Gilchr. et Stokes) Cif. et Red., the causative agent of the American Gilchrist disease (dermatitis verrucosa).**—*Journ. Trop. Med. & Hygiene*, xxxvii, 18, pp. 280–282, 1934.

An account is given of the writers' studies on the cultural, morphological, biochemical, and pathogenic properties of *Endomyces dermatitidis* (Gilchr. & Stokes) Moore, *E. capsulatus* Rewbridge, Dodge, & Ayers and its var. *isabellinus* Moore [*R.A.M.*, xiii, pp. 95, 636] pathogenic to man in the United States, and *Blastomyces gilchristi* from Brazil.

The gross characters and biochemical properties of the four strains are very similar and all are only mildly pathogenic to laboratory animals. An outstanding common feature of the three first-named organisms is their reversible cultural dimorphism. Cultures obtained from affected tissues on glycerol agar at 37° C. are granular, whitish, friable, and subcerebroid (type I or yeast-like). At room temperature on common solid media a more or less cottony growth is formed, the granulations being mixed with echinulate, subcoremioid hyphae (II or intermediary type). At another stage the cultures are quite white and cottony, with no traces of the yeast-like forms (III or hyphomycetic type), while a further

type (IV) resembles the foregoing but is of a brownish colour. *B. gilchristi* failed to develop at 37°, so that its dimorphic possibilities could not be investigated.

In respect of the morphological characters of the fungi under observation, Moore's observations are fully substantiated by the authors who, however, do not accept the reference of the *dermatitidis-capsulatus* forms to the genus *Endomyces* from which they are considered to be markedly different. A new genus, *Gilchristia* Cif. & Red., is therefore created and furnished with a Latin diagnosis. The following is the synonymy of the type species, *G. dermatitidis* (Gilchr. & Stokes) Cif. & Red. nov. comb.: *B. dermatitidis*, *Oidium dermatitidis*, (?) *Cryptococcus gilchristi*, *Zymonema dermatitidis*, *Mycoderma gilchristi*, *C. dermatitidis*, *E. capsulatus*, *Monilia capsulata* Vuillemin 1931, *E. dermatitidis*, *E. capsulatus* var. *isabellinus*, and *B. gilchristi* (non *Blastomycoides dermatitidis* Cast. 1927, nec. *Geotrichum dermatitidis* Cast. 1933).

Benham (Rhoda W.). **The fungi of blastomycosis and coccidioidal granuloma.**—*Arch. of Dermatol.*, xxx, 3, pp. 385–400, 13 figs., 1934.

Three important types of mycotic infection, each associated with a different fungus, are described, namely, cryptococcosis (*Cryptococcus hominis*) [*R.A.M.*, viii, p. 574], American blastomycosis or Gilchrist's disease (*Blastomyces dermatitidis*) [*Gilchristia dermatitidis*: see preceding abstract], and coccidioidal granuloma (*Coccidioides immitis*) [ibid., xiii, p. 635]. In addition to these three organisms there are at least seven others capable of causing systemic infections with granulomatous lesions appearing in the diseased tissue as rounded, yeast-like cells, namely *Histoplasma capsulatum* [*Posadasia capsulata*: ibid., xiii, p. 768], *Cryptococcus farcinimosus* [ibid., xii, p. 172], *Phialophora verrucosa* [ibid., xii, p. 370], *Hormodendrum* [*Trichosporium* or *Acrotheca*] *pedrosoi* [ibid., xiii, p. 234], *Rhinosporidium seeberi* [loc. cit.], *Sporotrichum schenckii* [ibid., xii, p. 569], and *Monilia* [*Candida*] *albicans*. *Torula histolytica* [ibid., xiii, p. 236] appears to be identical with *Cryptococcus hominis*; *Glenospora gammeli* [ibid., xiii, p. 637], *Monosporium tulanense* [ibid., xiii, p. 235], *Endomyces capsulatus* and its var. *isabellinus*, and *E. dermatitidis* [see preceding abstract] with *B. dermatitidis*; and *Scopulariopsis americana* [ibid., xiii, p. 235] with *Coccidioides immitis*.

Stowe (W. P.). **A simple technic for finding Coccidioides immitis.**—*Journ. Lab. & Clin. Med.*, xix, 9, p. 1013, 1 fig., 1934.

The characteristic spherical bodies of *Coccidioides immitis* [see preceding and next abstracts] have recently been found to show a strong iodine-staining capacity, taking a rich brown tint in five minutes with Lugol's or Gram's iodine solution at a concentration sufficient to colour the other cells in sputum or pus lemon-yellow.

Redaelli (P.) & Ciferri (R.). **Études sur le 'Coccidioides immitis' Stiles. II. Présence du granulome coccidioide en Europe.** [Studies on *Coccidioides immitis* Stiles. II. Presence of coccidioidal granuloma in Europe.]—*Boll. Sez. Ital. della Soc. Internaz. Microbiol.*, vi, 7–8, pp. 255–257, 1934.

After stating that up to June, 1931, only two cases of human infection

by *Coccidioides immitis* [see preceding abstract] had been reported from Europe, both in Naples, causing a mild form of pulmonary mycosis, the authors refer to a third case, also in Naples, in which the disease was contracted after an injection with a hypodermic syringe, the needle of which was presumably infected. The fungus was isolated by Castellani who regarded it as a new species *Glenospora meteuropaea* [*R.A.M.*, xiii, p. 162], but from a study of its cultural, biochemical, and biological characters the authors definitely consider it a strain of *C. immitis*, which they name *C. immitis* var. *meteuropaea*.

Attention is drawn to the fact that the three first truly autochthonous cases of the European form of the disease have all been observed in Naples and that in all three the disease, in striking contrast to what occurs in America, was present in a comparatively mild form.

Emmons (C. W.). **Dermatophytes: natural grouping based on the form of the spores and accessory organs.**—*Arch. of Dermatol.*, xxx, 3, pp. 337–362, 27 figs., 1934.

Considering the present systems of classification of the dermatophytes unsatisfactory, the writer has conducted morphological studies on plate and tube cultures, supplemented by a modified form of Henrici's culture cell method [*R.A.M.*, x, p. 257], the results of which have indicated certain natural lines of separation in the group.

The spores ordinarily termed aleuria and 'fuseaux' (spindles) are considered to be conidia and macroconidia. The subterminal elements of the branching conidiophore-like structure are regarded as actually spores, so that the latter are formed in short chains. The interspecific and intergeneric relationsips between the ringworm fungi may be determined by the form of the conidia. Three types of macroconidia are differentiated, viz., those of *Trichophyton*, clavate, thin-walled, with few septa; *Epidermophyton*, clavate to oval, thick-walled, few septa; and *Microsporon*, spindle-shaped, thick-walled, with up to 15 septa. These are the three natural groups of dermatophytes, and their generic names *Trichophyton* and *Microsporon* are retained on grounds of priority and *Epidermophyton* (*sensu* Sabouraud) on account of established usage. The genera *Achorion* and *Endodermophyton* are regarded as superfluous, their species falling within the limits of the three foregoing and their retention being a fertile source of confusion.

Chlamydospores and spirals have been found to possess little taxonomic value. Many species form 'nodular organs', which are probably ascogonia. In a series of attempted matings, the number of 'ascogonia' was increased at the line of junction between certain pairs, notably those involving *T. mentagrophytes*, but conclusive evidence of heterothallism was not obtained [ibid., xiii, p. 768].

In a general way, the mycological classification here proposed follows Sabouraud's clinical grouping. A partial list of the synonymy of the dermatophytes is given, based for the most part on the lines suggested by Langeron and Milochevitch, Ota and Kawatsuré, and others [ibid., xii, p. 694; xiii, p. 302, *et passim*]. The limits of *T. mentagrophytes* are further extended to include the *T. niveum* group [ibid., xii, p. 695]. Further work on this phase of the problem is in progress.

Aldick (W.). **Über eine Mikrosporieepidemie in Schleswig-Holstein und ihre Behandlung mit Zimtchloroform.** [On a *Microsporon* epidemic in Schleswig-Holstein and its treatment with cinnamon chloroform.] —*Arch. für Dermatol.*, clxx, 4, pp. 473–484, 6 figs., 1934.

In an epidemic of microsporiosis involving 301 children in Schleswig-Holstein, 29 of the 41 cultures of *Microsporon audouini* [*R.A.M.*, xiii, pp. 577, 637] examined on Grütz's agar developed a mutant form characterized by a slow formation of cerebriform colonies with slender peripheral extensions. Intercalary and terminal chlamydospores were present in abundance, but there was no aerial mycelium. On transference to maltose and glucose the variant (apparently a rudimentary form of the species) developed the typical characters of *M. audouini*. The mutation, however, cannot be ascribed to the influence of the medium since the latter also yielded typical cultures in 12 cases. The clinical and therapeutical aspects of the epidemic are discussed.

De Gregorio (E.). **Trichophytie cutanée par vaccination antivariolique.** [Cutaneous trichophytosis induced by anti-smallpox vaccination.]—*Ann. de Dermatol.*, Sér. 7, v, 9, pp. 854–863, 6 figs., 1934.

An account is given of an epidemic of cutaneous trichophytosis following vaccination, 23 cases of which were studied by the writer at Saragossa, Spain. The disorder assumed three well-differentiated clinical forms [which are briefly described] but the same causal organism was found to be responsible in all cases, viz., *Trichophyton faviforme discoides* [cf. *R.A.M.*, viii, p. 309; ix, p. 244; xiii, p. 701]. Numerous interlaced, unevenly septate hyphae and spherical spores occurred in the squamae and also developed in the fur of inoculated guinea-pigs. Infection must have originated in the cattle furnishing the inoculum, and evidently the organism was still in a viable state in the fresh material applied to the patients.

Baeza (M.). **Note statistique préliminaire sur les teignes du Maroc espagnol.** [Preliminary statistical note on the ringworms in Spanish Morocco.]—*Ann. de Parasitol. Humaine et Comp.*, xii, 5, pp. 405–407, 1934.

The preliminary results of the author's special investigation in the Spanish Protectorate of Morocco showed the preponderance among the older children of favus, the varying symptoms of which would suggest that the disease is either caused by other fungi than *Achorion schoenleini* [*R.A.M.*, xii, p. 510], or that there exist locally several different species of human *Achorion*. Younger children were chiefly affected with trichophytosis, almost exclusively caused by *Trichophyton violaceum*, with only a few cases due to *T. sulphureum* either alone or in association with the former.

Milochevitch (S.). **Diagnostic microscopique des teignes de la peau glabre.** [Microscopical diagnosis of ringworms on the glabrous skin.]—*Ann. de Parasitol. Humaine et Comp.*, xii, 5, pp. 408–417, 2 pl., 1934.

The author states, in agreement with some other investigators, that an accurate determination of the specific cause of ringworms developing

on the human glabrous skin cannot be made by the examination of the elements of the organism contained in the squamae from the lesions, nor from their aspect either on or in the downy hairs (lanugo) which are commonly present on such skin. As indicated, however, by a number of clinical cases [details of which are given], a definite diagnosis can be arrived at by studying the development of the fungus in the coarser hairs which also occur sparsely on the glabrous skin. His recent work has allowed him to distinguish four types of glabrous skin ringworms by this means, namely, endothrix, megaspore, microid, and *Microsporon*, and in every case he obtained in culture the corresponding organism as diagnosed in advance.

Takahashi (S.). **Über eine neue Art von tierischem Microsporon.** [On a new species of animal *Microsporon*.]—*Japanese Journ. of Dermatol.*, xxxvi, 3, pp. 261–266, 7 figs., 1934. [Japanese, with German summary on pp. 55–56.]

Microsporon sapporoense n.sp. is the name given to a fungus isolated from the well-defined, maculo-vesicular lesions on the chest and upper arm of a young Korean labourer. The septate hyphae occurring in the squamae were 3 to 4 μ in width and grew rapidly on Sabouraud's maltose agar, forming furcate colonies with alternating deep and pale yellow zones and a whitish periphery. Later the colour deepens from the centre outwards and within about four weeks the consistency of the colonies undergoes pleomorphic pubescent and pulverulent modifications. Satisfactory growth was also made on peptone, potato, and carrot agars, the colonies on the first-named being chocolate-coloured and on the others brownish-white. Numerous spindles, nodular organs, and chlamydospores (terminal and intercalary) developed. Positive results were given by inoculation experiments on laboratory animals.

Seehawer. **Mykologische Untersuchungen über die im Hoppegarten beobachtete Trichophytie der Rennpferde.** [Mycological investigations on the trichophytosis of racehorses observed in Hoppegarten.] —*Zeitschr. für Veterinärkunde*, xlvi, pp. 180–194, 1934. [Abs. in *Zentralbl. für Bakt.*, Ab. 1 (*Ref.*), cxv, 17–18, p. 410, 1934.]

Trichophyton equinum [*R.A.M.*, xiii, p. 303] was found to be the agent of an epizootic dermatomycosis of racehorses in Berlin. The fungus grew readily on Grütz's nutrient medium. Partial immunity was acquired both by horses and guinea-pigs after one or more artificial inoculations. *T. equinum* proved to be highly pathogenic to man. It is believed to have been introduced from abroad with foreign racehorses.

Lebasque (J.). **Recherches morphologiques et biologiques sur les Trichophyton mégaspores du cheval et du boeuf.** [Morphological and biological studies on the equine and bovine megasporous species of *Trichophyton*.]—*Ann. de Parasitol. Humaine et Comp.*, xii, 5, pp. 418–444, 2 pl., 3 figs., 1934.

This is a full morphological and cultural account of the three new species of *Trichophyton* causing equine and bovine ringworms, a brief report on which was given in a previous communication [*R.A.M.*, xiii, p. 303], namely, *T. bullosum* from the horse in Tunis, Sudan, and Syria,

T. villosum from cattle in Tonkin and Annam, and *T. papillosum* from cattle in Syria and Morocco. *T. bullosum* belongs to the megasporous endo-ectothrix group; around the attacked hairs it produces rounded spores, 5 to 8 μ in diameter, often in chains, while inside the hairs the spores are somewhat smaller (3 to 4 μ) and are disposed in a mosaic-like pattern. In the squamae the mycelium is branched and composed of cells 7 to 11 by 2·5 to 3·5 μ in diameter, interspersed with thick-walled, oblong spores measuring 8 to 10 by 4 to 5 μ. *T. villosum* also belongs to the same group; around the affected hairs it forms an incomplete sheath consisting of round, thick-walled spores, 4 to 8 μ in diameter, grouped in long, irregularly disposed chains. In the squamae threads are found, composed of elongated, very thick-walled spores, measuring 8 to 10 by 3 to 4 μ, together with long, apparently non-septate hyphae of the same width. *T. papillosum* forms, around the hairs, a continuous sheath, adhering to the Henle layer, composed of polyhedral spores, disposed in a mosaic-like pattern, and measuring 6 to 8 μ in diameter. When the Henle layer of cells is broken, the spores are round and very large (8 to 12 μ), and are disposed in chains adhering to the epidermicule. Among the debris of the epidermis are found mycelial threads, 5 to 6 μ in width, with septa at intervals of 7 to 8 μ.

The remainder of the paper is given to a discussion of the affinities of the faviform megasporous species of *Trichophyton* parasitizing the horse and cattle, most of which has already been noticed [loc. cit.]. In addition, it is stated that experiments have shown that the aleuria of *T. album*, which are produced when the fungus is grown on barley or wheat grains or on horse droppings, are highly infective, a fact which would suggest that the animal dermatophytes are able to live as saprophytes in damp and poorly aerated stables, this offering a ready explanation of the outbreaks of ringworm in cattle kept over winter indoors, without any apparent infection from outside.

Weisz (E.). **Die Pilzflora des menschlichen Fusses.** [The fungous flora of the human foot.]—*Arch. für Dermatol.*, clxx, 4, pp. 485–486, 1934.

Kaufmann-Wolf's *Epidermophyton* [*R.A.M.*, xiii, p. 237] and *Scopulariopsis brevicaulis* [*Penicillium brevicaule*: ibid., xiii, p. 512] were responsible for 25 and 13 per cent., respectively, of the cases of foot mycosis investigated by the writer at Budapest, the remainder being due to yeasts, *Epidermophyton*, *Trichophyton*, and *Achorion* spp. Both on diseased and normal feet the incidence of fungi was higher and more variable than in other parts of the body.

Glingani (A.). **Isolamento di un raro micete (Corethropsis hominis) da dermatosi interdigitale.** [Isolation of a rare fungus (*Corethropsis hominis*) from a case of interdigital dermatitis.]—*Atti Ist. Bot. R. Univ. di Pavia*, Ser. IV, v, pp. 5–23, 11 figs., 1934. [Latin and English summaries.]

From a case of dermatitis interdigitalis dysidrosiformis on the hand of a female patient the author isolated a fungus which in culture on various media formed yellowish-white or creamy colonies with yellowish-red shading, at first cottony and later granulose-pulverulent. Conidia

are produced in clusters formed of spherical or spheroidal spores measuring 2·5 μ in diameter and borne singly at the tips of short, crowded, branched conidiophores. The organism, which is considered to be a variant of *Corethropsis hominis* [*R.A.M.*, ix, p. 244], is named *C. hominis* Vuillemin var. *sphaeroconidica* Cif. et Bald. n. var. Inoculations of laboratory animals with pure cultures of the fungus gave negative results and its pathogenicity is regarded as very doubtful. This is stated to be the first record of the species since its original isolation [loc. cit.].

McCrea (Adelia). **Fungicidal value of some common dyes against dermatophytic fungi.**—*Mycologia*, xxvi, 5, pp. 449–453, 1934.

A tabulated account is given of the writer's experiments on the control of *Trichophyton interdigitale* [*T. mentagrophytes*] and *Epidermophyton* [*T.*] *rubrum* by five aniline dyes, viz., aniline violet, basic fuchsin, gentian violet, brilliant green, and malachite green [*R.A.M.*, x, p. 791; xiii, p. 238], *Aspergillus niger* being used for comparison. The two last-named substances proved superior to any of the others tested, especially against *T. mentagrophytes* which was killed by both at a strength of 1 in 75,000 in one minute. *T. rubrum* and *A. niger* were more resistant, a concentration of 1 in 10,000 being required to kill them in the same time. Aniline violet proved lethal to *T. mentagrophytes* in five minutes at 1 in 500 but failed to destroy the other two organisms in periods up to one hour. Neither basic fuchsin nor gentian violet gave any indication of practical utility for the purpose in view.

Woodward (G. J.), Kingery (L. B.), & Williams (R. J.). **The fungicidal power of phenol derivatives. I. Effect of introducing alkyl groups and halogens.**—*Journ. Lab. & Clin. Med.*, xix, 11, pp. 1216–1223, 1934.

Using a modification of Kingery's and Adkisson's method [*R.A.M.*, vii, p. 634], the writers tested the fungicidal activities of 37 phenol derivatives and some miscellaneous fungicides on *Monilia* [*Candida*] *tropicalis* [ibid., xiii, p. 767], *Cephalosporium* sp., and *Sporotrichum* sp.

The results of the experiments [which are tabulated and discussed] showed that the substitution of one or more alkyl (especially dialkyl) groups on the benzene ring in phenols increases fungicidal activity. Compounds containing an alkyl group with six carbon atoms arranged in a straight chain appear from the present data to have the highest phenol coefficients. The toxicity of the phenols towards the test organisms was found to be several times multiplied by the substitution of halogen atoms (iodine, bromine, and chlorine in the order named). Of the phenol derivatives under investigation, n-hexylresorcinol [ibid., xiii, pp. 164, 791] and the n-hexyl ether of resorcinol gave the best fungicidal effect on the test fungi, closely followed by chlorothymol; all three should be of practical utility in the treatment of human skin diseases. Promising results were also given by the n-butyl, n-amyl, and phenyl propyl ethers of resorcinol and 3·5-dibutyl phenol, while thymol, carvacrol, and salicylic acid are actually being used with fair success in therapeutical work.

Mundkur (B. B.). **A Sclerotinia rot of Hibiscus sabdariffa Linn.**—*Indian Journ. Agric. Sci.*, iv, 4, pp. 758–778, 3 pl. (1 col.), 1 graph, 1934.

A detailed account is given of the author's study of a serious stem rot of 'patwa' (*Hibiscus sabdariffa*) grown for seed at Pusa, caused by *Sclerotinia sclerotiorum*. Infection from sclerotia and mycelium only occurs in December and January through wounds in the stems, but under experimental conditions the unwounded tissues can be infected by the ascospores from November onwards, though early infection from this source does not occur in nature since the ascospores are not produced in the field before on the onset of cool weather (22° C. or lower). The optimum temperature for growth of the fungus was found to be about 22°, with a minimum apparently at 8° or below, and a maximum at 32·5°. The sclerotia were not killed by exposure to dry heat as high as 60°, but were destroyed by immersion for five minutes in water at 48° to 50° C. Sclerotia buried in soil at a depth of over one inch did not produce apothecia, indicating the advisability of deep ploughing of infected land as a means of control of the disease. Infected seed should be hand-picked to remove the sclerotia, as these bodies have been found in the seed collected from an infected plot. On sound plants infection evidently is caused chiefly by the ascospores which are believed to infect normally through the dead corolla or calyx of the flowers and to pass back into the stem through the pedicel. No evidence of natural infection from the soil or through the roots was obtained.

Bongini (Virginia). **Un nuovo fungillo della Peonia.** [A new fungus on Peony.]—*La Difesa delle Piante*, xi, 4, pp. 109–121, 9 figs., 1934.

Some years ago peonies growing in northern Italy were attacked by a disease which has not since reappeared and is thought to have been favoured by the weather conditions then prevalent. Both herbaceous and shrubby varieties were affected, but on the latter the effects were practically negligible. In herbaceous varieties brown, dry, irregular, spots with greyish concentric zones surrounded by a darker edge and a yellowish, shaded halo, developed on the leaves, usually at the tip or edges, occasionally in the middle. The centres of the lesions gradually became ash-coloured. The dead areas, which were round or slightly elliptical, at first measured only a few millimetres in diameter but spread as concentric rings bordered by grey lines until in the middle of the leaf blade they reached a diameter of 4 cm. Spots near the tip spread inwards for distances of up to 5 cm., the zonate formation being retained. The discoloured areas later split, the dead tissue crumbled away, and the leaves withered and fell. On the leaf stalks the spots measured 1 to 4 mm. in diameter, were ash-coloured at the centre and dark brown at the periphery, and were slightly elongated along the axis.

The spots bore amphigenous, globose, membranous, blackish-brown, glabrous, depressed, later erumpent pycnidia measuring 180 to 200 μ in diameter and with a very small ostiole; the hyaline, straight, slightly clavate sporophores measured 12 by 4 μ, and the elliptical, obovate or ovoidal, continuous, very occasionally 1-septate, hyaline, later olivaceous, then brown, guttulate spores were rounded at each end and averaged 20 to 25 by 10 μ.

When fresh material was grown in hanging drop cultures the young spores germinated after 36 to 38 hours at 20° or 22° C., and after about 30 hours at 26° or 28°. Normally, germination always occurred laterally at or near one end of the spore. Growth was moderately rapid, the mycelium turning chlorine-chestnut after the second day at a temperature ranging between 22° and 26°. The spore production was, however, insufficient for inoculation experiments. Spores from cultures kept in the laboratory for over two years failed to germinate.

The author considers that her fungus is a *Sphaeropsis* morphologically distinct from the species of this genus hitherto described, and names it *S. paeoniae* with a Latin diagnosis.

Green (D. E.). **The virus of spotted wilt in Gloxinias.**—*Gard. Chron.*, xcvi, 2488, p. 159, 1 fig., 1934.

Gloxinia [*speciosa*] plants examined at the Royal Horticultural Society's laboratory, Wisley, Surrey, in June, 1934, were found to be severely affected by the tomato spotted wilt virus [*R.A.M.*, xiii, p. 647]. This adds another new host to the list of those already known to harbour the virus in England, including [in addition to a number already mentioned in this *Review*] broad beans [*Vicia faba*] and bindweed [*Convolvulus arvensis*]. The diseased *Gloxinia* leaves showed well-defined, brown rings, sometimes contiguous, of necrotic tissue enclosing healthy green areas, and tests by Dr. K. M. Smith at Cambridge established the identity of the virus.

Tilford (P. E.). **Stem canker disease of Gardenia.**—*Ohio Agric. Exper. Stat. Bimonthly Bull.* 168, pp. 116–117, 1 fig., 1934. [Abs. in *Exper. Stat. Record*, lxxi, 5, p. 662, 1934.]

Greenhouse *Gardenia* plants in Ohio were observed to bear rough, swollen cankers on the stem bases, causing stunting and gradual decay. Black pycnidia of the *Phomopsis* type were detected half-buried in the affected cortex, exuding yellowish masses of filiform and elliptic-fusiform spores under very moist conditions [*R.A.M.*, xiii, p. 379]. Both spore-forms occurred in the same pycnidium. The fungus appears to be a weak wound parasite, infection by which may be avoided by ordinary care in cultural operations.

Hino (I.) & Hidaka (Z.). **Beautiful spotted Bamboos from Hiuga, Japan.**—*Botany & Zoology*, Tokyo, ii, 7, pp. 1187–1196, 12 figs., 1934. [Japanese.]

The rare and beautiful spotted bamboos ('hantiku'), which have been greatly prized in Japan from the earliest times, were formerly considered to represent a distinct botanical form (*Phyllostachys bambusae* forma *tanakae* or *P. reticulata* f. *tanakae*). The writers' studies have shown, however, that the bamboos in question are simply ordinary specimens of *P. reticulata* attacked by an Ascomycete, *Asterinella hiugensis* n.sp., and not a special variety. The fungus reported by Kawamura on spotted bamboos from Hiuga in 1930 as *Micropeltis bambusicola* [*R.A.M.*, viii, p. 468] has been transferred by the writers to *Phragmothyrium* as *P. semiarundinariae*. It produces a handsome spotted effect on the

culms of *Semiarundinaria narikirae*. In both these cases another species of *Phragmothyrium*, *P. japonicum* n.sp., was found on the lesions.

Latin diagnoses are given of the three fungi. *A. hiugensis* has dimidiate-convex perithecia, 103·5 to 402·5 μ in diameter, containing numerous filiform, hyaline paraphyses, 1 to 2 μ in breadth, and ellipsoidal, 8-spored asci, 25·7 to 47·5 by 21·8 to 31·4 μ in diameter. The ascospores are ovoid, obtuse-ended, 1-septate, constricted, ultimately brown, and 16·2 to 20·9 by 8·6 to 10·5 μ. *P. semiarundinariae* has superficial convex-scutate perithecia, 25·6 to 176·0 μ in diameter, without a hirsute margin. The asci are cylindrical, short-stalked, obtusely attenuated at the apex, 8-spored, and 41·6 to 57·6 by 9·6 to 10·9 μ in diameter; crowded filiform paraphyses, 1·5 μ in breadth are also present. The ascospores are elliptical-oblong, straight, with an obtuse apex, hyaline, usually 2-, rarely 3-septate, slightly constricted and 12·8 to 15 by 2·6 to 4·8 μ. *P. japonicum* has convex-dimidiate perithecia, 16·3 to 71·5 μ in diameter, not hirsute at the margin, with fusoid, obtusely attenuated, 8-spored asci, 45·5 to 65·5 by 6·5 to 9·8 μ, and numerous hyaline, filiform paraphyses, 75 to 110·5 by 2·5 μ. The ascospores are fusoid, hyaline, 5-septate, slightly constricted, and 16·5 to 22·5 by 1·8 to 4·5 μ in diameter.

Shapiro (Mme S. M.). Оригинальный случай мозаики у **Lappa sp.** [A curious case of mosaic in *Lappa* sp.]—ex *Вирусные долезни растений в Крыму и на Украине* [*Virus diseases of plants in the Crimea and the Ukraine*], pp. 109–113, 4 figs., Госуд. Издат. Крым [State Publ. Office for the Crimea], Simferopol, 1934. [German summary.]

A brief morphological account is given of a disease of a species of burdock (*Lappa*) [*Arctium*] which has been observed by the author since 1925 in Kharkoff [Ukraine]. In mild cases the disease is characterized by a mosaic pattern on the leaves, strongly suggestive of a virus disease, and this is supported by the anatomical changes caused in the leaves; in cases of more severe infection, however, the leaf lamina is considerably reduced, until occasionally it may assume all the shapes described for the fern-leaf disease of tomato [*R.A.M.*, xiii, p. 809]. The disease is believed to be the first record in weeds of such malformation of the leaves, presumably due to a virus agency, and is interesting because of its possible relationship with the tomato disease.

Richter (H.). **Eine noch nicht aufgeklärte Lupinenkrankheit.** [A hitherto unexplained Lupin disease.]—*Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, xiv, 9, pp. 81–82, 4 figs., 1934.

Attention is drawn to an obscure disease of lupins (*Lupinus luteus*, *L. albus*, and *L. angustifolius*) which has been the subject of investigation at the Berlin Biological Institute for the last three years. The first symptoms are brown, striate discolorations of the stem, rapidly followed, especially in young plants, by crooking of the upper portion of the shoot, the tip of which is often bent downwards to form a hook.

The stem tissues become translucent and brittle, and the foliage wilts and droops. In some cases the initial stages of the disease are accompanied by a dark spotting of the base of the shoot, just above soil level, giving the impression of an incipient foot rot. In older plants the pods turn brown and shrivel, the seeds, if any, being poorly developed. Brown, necrotic foci occur in the collenchyma of the stem and extend into the cortical parenchyma. The xylem is discoloured and the wood vessels partially occluded by a homogeneous brown mass; ultimately the phloem and (just before the death of the plant) the cambium also become involved. No pathogenic organisms have been isolated from the diseased tissues, and the presence of *Fusarium* spp. in the root system of affected lupins is thought to be of purely secondary importance [cf. next abstract].

NEILL (J. C.). '**Sore shin**': **a virus disease of blue Lupins.**—*New Zealand Journ. of Agric.*, xlix, 3, pp. 139–146, 3 figs., 1934.

During the past three years, blue field lupins [*Lupinus angustifolius*] in New Zealand have been widely attacked by a disease for which the name 'sore shin' is suggested. At Palmerston North all the plants in one plot became affected, while up to 30 per cent. infection was reported from other localities. The incidence of the disease is usually greatest where successive lupin crops are grown for green manure.

The affected plants first showed slight stunting with a characteristic curling of the growing point to one side, on which a light brown streak appeared simultaneously and gradually spread along the whole length of the stem. Growth ceased with the first symptoms. When a diseased plant was cut, the vascular system showed a brown discoloration more extensive in the roots and growing point than in the main stem. Eventually, however, the whole stem turned brown. The young leaves wilted and blackened, while the older ones became tinged with purple, turned yellow and fell. The stem became black, the roots decayed, and the plant died. Infection occurred at all stages of growth.

Isolations from diseased material yielded bacteria and a *Fusarium*, inoculations with which into healthy lupins gave negative results [see preceding abstract]. When the leaves of healthy lupins were rubbed with juice from diseased plants typical symptoms resulted in 33 out of 89 plants, all of 48 uninoculated controls remaining healthy. No sore shin developed on 115 lupins grown from seed taken from affected plants.

It is concluded that the disease belongs to the virus group, and is not seed-borne.

PELTIER (G. L.). **The inability of Aplanobacter insidiosum to enter Alfalfa seedlings in the absence of wounds.**—*Phytopath.*, xxiv, 9, pp. 1044–1045, 1934.

Particulars are given of experiments under controlled greenhouse conditions at Lincoln, Nebraska, the results of which conclusively demonstrated the incapacity of *Aplanobacter insidiosum*, the agent of lucerne wilt [*R.A.M.*, xiii, p. 582], to enter the plants (Grimm) except

through wounds. It is considered safe to assume that, under ordinary field conditions, the same limitations will apply.

SHAW (L.). **Studies on resistance of Apple and other Rosaceous plants to fire blight.**—*Journ. Agric. Res.*, xlix, 4, pp. 283–313, 1 pl., 13 graphs, 1934.

A detailed account is given of greenhouse and orchard experiments at Madison, Wisconsin, the results of which [shown in graphs] indicated that the 31 species of Rosaceae (belonging to the genera *Amelanchier*, *Aronia*, *Cotoneaster*, *Crataegus*, *Malus*, *Pyrus*, and *Sorbus*) tested varied widely in their relative resistance to fireblight (*Erwinia amylovora*) [*Bacillus amylovorus*: *R.A.M.*, xiii, p. 707]. While apples, as a class, exhibited the least resistance, wide differences were also found in the relative susceptibility of the 25 varieties studied, the differences being of the same order both under greenhouse and orchard conditions. Of the four varieties that were tested most intensively, Northwestern Greening was consistently found to be the most and Yellow Transparent the least resistant, McIntosh and Wealthy being intermediate but somewhat variable in their reaction. Resistance was shown to increase with the age of the shoots, the increase being most rapid in Northwestern Greening and slowest in Yellow Transparent. The development of resistance appeared to be favoured by a low content of the soil in nutrients and a relatively low soil moisture, as well as by an atmospheric temperature of 28° C. during the period prior to inoculation of the shoots; 16° was the least favourable of the temperatures (16°, 20°, 24°, and 28°) tested. In Fameuse apple shoots, the development of resistance was best favoured by soil temperatures of 12° and 32°, and least by those of 20° and 24°. A positive relation was found between resistance and lowered vigour of the shoots. In Northwestern Greening and Wealthy trees, resistance to the blight was decreased by prolonged exposure to atmospheric moisture approaching saturation after inoculation, new shoots usually blighting entirely on trees subjected to high humidity for 72 and 93 hours. Resistance in the new terminal growth of the shoots was found to be directly related to low atmospheric humidity.

The work also showed that the fireblighted tissues were usually separated from the healthy by cork layers during the late stage of the development of the disease, the cork layer usually involving the entire circumference of the shoot and extending inwards through the cortex and apparently through the phloem and cambium; a well-defined cork layer was not, however, observed inside the cambium. The pathogen was commonly found in all the tissues extending towards the apex of the shoots from the cork layers, and also in the xylem and pith (but not in the cortex, phloem, or cambium) at considerable distances towards the base of the shoots. Evidence was also obtained that once the lesions are corked-off, the cork layers and the xylem commonly serve as relatively effective barriers against further invasion by the organism of the cortical, phloem, and cambial tissues. While the varieties of apple differed in the time after inoculation required for the corking-off process, in general this time was shortest in the more resistant varieties. The process was favoured by low soil moistures and delayed by high atmospheric humidity.

WORMALD (H.). **The development of scab in stored Apples.**—*Journ. Min. Agric.*, xli, 6, pp. 551–556, 4 figs., 1934.

In February, 1934, the author examined Bismarck apples taken from storage and showing (*a*) saucer-shaped, slimy, jet-black depressions with fairly well defined margins, (*b*) superficial dark brown spots showing irregular margins, and (*c*) pin-head spots [*R.A.M.*, viii, p. 155]. Some of the sunken spots bore conidial fructifications of *Venturia inaequalis*. The largest individual spots were about $\frac{1}{8}$ in. in diameter, but in places the lesions coalesced into sunken, blackened areas up to $\frac{3}{4}$ in. across. A few spots of the ordinary fruit scab type were also found. Apples of other varieties stored under the same conditions remained unaffected.

In March, Bismarck apples showing the same circular, jet-black, sunken spots were received from another locality. Each spot contained a thin pad of fungal cells beneath the cuticle, from which, on some of the spots, the fungus had developed cushion-like outgrowths that burst through the cuticle, forming pustules on the surface. These had the stromatic structure of the scab fructifications seen on apple twigs, and bore spores of the *Fusicladium* stage of the fungus. Fragments of the smaller, more superficial spots in culture gave rise to *Fusicladium* spores. Newton Wonder and Bramley's Seedling apples stored in boxes near the Bismarck apples remained unaffected.

It is concluded that this type of injury results from scab infection but appears only after the fruit is picked; whether the original infection takes place before or after picking is at present uncertain. The Bismarck variety is known to be highly susceptible to scab, and the apples had obviously been stored under conditions very favourable to the disease.

To avoid storage scab routine spraying must be systematically practised, a late application of spray being given if required [ibid., xii, p. 32]; the fruit must not be stored wet.

RAWLINS (T. E.) & PARKER (K. G.). **Influence of rootstocks on the susceptibility of sweet Cherry to the buckskin disease.**—*Phytopath.*, xxiv, 9, pp. 1028–1030, 1934.

Sweet cherry (Napoleon and Black Tartarian) trees on Mahaleb (*Prunus mahaleb*) stock appear to be capable of escaping or resisting natural infection by the graft-infectious buckskin disease [*R.A.M.*, x, p. 528] in California, but such trees were shown in recent experiments to develop severe chlorosis on grafting with diseased Napoleon scions. Trees contracting infection in this way rarely show any symptoms on the fruit, in contrast with those on Mazzard and Morello stocks that exhibit little or no chlorosis but produce conical, prematurely shrivelling fruits with abnormally short pedicels. When diseased and normal susceptible scions were grafted on different branches of Mahaleb seedlings, the former became very chlorotic and made little growth, but the infection did not extend through the Mahaleb tissues to the normal scions, which grew as much as similar scions grafted on check trees.

GRIEVE (B. J.). **The isolation of the organism causing crown gall on Almond trees in Victoria.**—*Proc. Roy. Soc. Victoria*, N.S., xlvi, 2, pp. 214–219, 1 pl., 1934.

Positive results were obtained on almond, peach, hop, castor oil

plant [*Ricinus communis*], tomato, and sunflower by inoculation with an organism isolated from crown galls on the first-named host in Victoria and considered, in virtue of its morphological, cultural, and physiological characters [which are described], to be identical with *Bacterium tumefaciens* [*R.A.M.*, x, p. 249].

WELLMAN (F. L.). **A disease of Banana, markedly similar to bunchy top, produced by Celery virus 1 in U.S.A.**—*Phytopath.*, xxiv, 9, p. 1032–1034, 1 fig., 1934.

Among several thousand Lady Finger banana plants (*Musa sapientum*) in the Sanford district of Florida were six with symptoms suggestive of virus infection which were destroyed by the owners. Healthy banana plants grown in a greenhouse in insect-proof cages were exposed to aphids carrying the virus originating from cuttings of the same *Commelina nudiflora* plant that yielded the original celery virus strain [see above, p. 93]. One group of diseased *C. nudiflora* shoots was colonized for 14 days with *Aphis gossypii* before the transfer of the latter to the bananas and another with *A. maidis*; neither of these insects has been observed on bananas grown locally. Of the 15 banana plants exposed to *A. gossypii*, 13 became diseased, while both those to which *A. maidis* was transferred contracted infection, the incubation period ranging from 21 to 33 days. Four of the seven controls were infested with virus-free aphids from healthy *C. nudiflora*, and none became diseased.

The third leaf appearing after inoculation was chlorotic, slow to unfurl, frequently drooping, and extensively mottled. Succeeding diseased leaves were tightly rolled, abnormally slow to develop, and brittle; the petioles were mottled, with malformed fibrovascular bundles, and necrotic spots and streaks often occurred on the leaf blade and pseudostem. The reduction of the petioles and leaf blades imparted a stunted, rosette-like appearance to the plants suggestive of bunchy top [*R.A.M.*, xiii, p. 642]. Affected leaf sheaths were retarded in growth and lost some of their flexibility. Partial strangulation of the newest leaves in the centre of the pseudostem was the cause of malformation and occasional splitting of the leaf sheaths. No sign of fruit bud formation could be detected on the dissection of nine of the oldest severely diseased plants.

Typical symptoms of virus infection were also produced by the aphids from diseased *C. nudiflora* on healthy *Commelina*, cucumber, and celery plants, from which the infective principle was readily recovered either by expressed juices rubbed on cucumber cotyledons or by transference by means of *A. gossypii*. Neither of these methods, however, was effective in the isolation of the virus from the infected bananas.

Slight cupping of the leaves, as described by Magee and Ocfemia [ibid., vii, p. 253; ix, p. 384], occurred on two Cavendish banana plants similarly inoculated with viruliferous *A. gossypii*.

The Panama Disease of Bananas Amendment Order 1934.—*Journ. Jamaica Agric. Soc.*, xxxviii, 9, p. 573, 1934.

By the Panama Disease of Bananas Amendment Order, **1934 [cf.** *R.A.M.*, [illegible], p. 80], the Director of Agriculture, Jamaica, is **empowered**

to prescribe and authorize modifications of the measures to be taken for the treatment of the disease caused by *Fusarium oxysporum cubense*.

Under this Order the Director of Agriculture authorized in August, 1934, certain modifications in the treatment of the disease in the parish of St. Mary. All bananas suffering from Panama disease must be cut down and the base of the plant together with the cut-up debris treated with oil, an area of not less than 6 ft. around the site being dealt with as an infected area [ibid., v, p. 63; xii, p. 38].

In reply to a plea by Mr. U. T. McKay for a general reduction in the number of roots required to be eradicated from nine to one the Director of Agriculture, the Hon. A. C. Barnes, stated (pp. 551–552) that he had recently informed a deputation of representative planters from the parish of St. Catherine that in those districts where the incidence of the disease was so high as to make the usual treatment impracticable the inspectors would be expected to exercise their discretion, but that the Department of Agriculture could not advise the Government to adopt the 1-root treatment in other parishes than St. Mary (where the 9-root system had served its purpose) until the results obtained from it in that parish during at least one year had been ascertained.

Servazzi (O.). **Sull'arrossamento fogliare del Kaki (I[a] Nota).** [On the leaf reddening of Persimmon (1st Note).]—*La Difesa delle Piante*, xi, 4, pp. 122–137, 5 figs., 1 graph, 1934.

In July 1933, persimmon (*Diospyros kaki*) trees growing at Cavour showed a characteristic leaf discoloration which, beginning as a yellowing at the tip, rapidly caused the whole surface to turn brick-red. The affected leaves remained succulent, but fell prematurely. The histological characters of the condition were consistent with those induced by the approach of cold weather, but a few of the leaves showed the presence of a sparse mycelium, which after exposure to damp conditions in the laboratory was found to be that of a fungus with globose-depressed, later erumpent acervuli measuring 200 to 250 by 50 to 60 μ and fusiform, S-shaped or straight, 6-celled conidia, in which the 4 middle cells were honey-brown and occasionally constricted at the septa, while the apical cell was hyaline, beak-shaped or elongated-conical mucronate and the basal one hyaline and conical or truncated-conical. The mature conidia were rather uniform in shape and size and averaged 37 to 40 μ (including the beak) by 10 to 11·5 μ. The hyaline conidiophores measured 60 to 67 by 1·8 to 2 μ. From its morphological characters the fungus is considered to be a new species of the genus *Coryneum*, which the author names *C. delleanii* with a Latin diagnosis.

In hanging drop cultures in Raulin's medium (P_H 4·6) 80 per cent. of the conidia had germinated after 37 hours, while in neutral media germination was retarded. Germination was usually from the bottom coloured cell, a second germ-tube sometimes growing out from the uppermost or occasionally from one of the middle coloured cells. Before germination the coloured cells became swollen and constricted at the septa. Sometimes spherical bodies (probably secondary conidia) formed after a short growth of the germ-tube. On solid media the optimum growth temperature lay between 25° and 26° C., growth becoming retarded below 20° and above 28° and ceasing at 32°.

Inoculation tests on wounded and unwounded persimmon leaves with suspensions of germinating conidia gave negative results, possibly because adult leaves were used, the juices of which are too acid to favour the growth of the organism. *C. delleanii* is probably a weak parasite of trees exposed to unfavourable conditions.

Turnbull (J.). **New type of spray for fruit trees.**—*Journ. Min. Agric.*, xli, 5, pp. 433–435, 1 pl., 1934.

A new fixed double spray nozzle of the common disk pattern made by Messrs. Drake and Fletcher of Maidstone is described and figured. The spray starts to widen at less than 1 ft. from the nozzles, where both sprays meet, attains a width of 2ft. at less than 3ft from the nozzles, and maintains that breadth throughout. The length of spray ejected naturally varies with the pressure and also, apparently, with the capacity of the pump; with a good 4 h.p. outfit working at a pressure of 250 lb. per sq. in., two double nozzle leads being used, the effective 'carry' is about 15 ft. The appliance is satisfactory with all kinds of trees from 10 to 30 ft. high, including (if 6 ft. lances and a pressure of 400 lb. are used) the tallest apple trees.

Casaburi (V.). **Employment of synthetic tannins and their metallic salts for disinfecting and stimulating seeds.**—*Internat. Rev. of Agric.*, N.S., xxv, 8, pp. 342–344, 1934.

In tests of the value as seed disinfectants of various natural and synthetic tanning materials, the author (who is Director of the Royal Station for the Hide and Tanning Industry at Naples) states that interesting results have been obtained with the metallic salts of 'alpha' tannin. The latter is a synthetic tanning substance prepared by the sulphonation of betanaphthol and condensation by aldehyde with or without methoxylic groups furnished by the derivatives of cellulose. The mercury salt produced with 'alpha' is really a simple salt of sulphonic acids of the methylenedinaphthols.

This and other metallic salts of synthetic tannins have been mixed with 'dry tan', a special emulsion of paradichlorbenzene adsorbed by talc, and put on the market as a dry disinfectant known as 'uni-dea'. Excellent disinfection of wheat seed-grain against *Tilletia tritici* [*T. caries*] as well as stimulation of germination are stated to have been obtained by the use of uni-dea.

Jensen (V.) & Ørner (H.). **Undersøgelser over nogle Stoffers Anvendelighed til Medikamentkonservering. II. Skimmel og lignende.** [Investigations on the applicability of certain substances for the preservation of medicaments. II. Moulds and the like.]—*Dansk Tidsskr. Farm.*, viii, 9, pp. 233–261, 1934.

The writers tabulate and discuss the results of their experiments on the comparative efficacy of a number of chemicals as preservatives against the moulds and yeasts shown by isolation experiments to occur in pharmaceutical preparations in Denmark, e.g., *Aspergillus glaucus* in Sol. cocaini hydrochloridi, *A. flavus* in Extr. Pini silvestris, *A. niger* in Sol. natrii arsenalis, *A. fumigatus* in Syr. Papaveris, *Penicillium glaucum* in Syr. Seneg. and Sol. morphini hydrochloridi, *Citromyces*

pfefferianus in Sørensen's citrate solution, *Cladosporium herbarum* in Iodum colloidale and Sol. kalii chloratis, *Dematium* [*Pullularia*] *pullulans* [*R.A.M.*, xiv, p. 2] in Inf. Valerianae, *Mucor racemosus* in Tablet. novocaini, *M. mucedo* in Tabl. ovariae, and *Rhizopus nigricans* in Ung. cetacei and Extr. Belladon.

The organisms grew well on a number of standard media (mostly fruit), of which banana agar proved to be the cheapest and most readily obtainable. In the preservation tests the chemicals were added in appropriate concentrations to cultures of the organisms in 2 per cent. dextrose bouillon. Among the more promising substances were the following. Quinosol [ibid., xiv, p. 9] destroyed all the species of *Aspergillus* at 1 in 1,000 in 48 hours, *A. glaucus* succumbing at 1 in 1,500, as also did *Citromyces pfefferianus* and *P. pullulans*. One of the two strains of *Penicillium glaucum*, *Cladosporium herbarum*, *M. mucedo*, and *R. nigricans* proved more resistant, requiring concentrations of 1 in 600 to produce a lethal effect, while a strength of 1 in 500 was necessary to kill *M. racemosus* in the same time. Hexylresorcinol [see above, p. 105] destroyed *C. herbarum* at 1 in 4,000 in 48 hours and one strain each of *A. fumigatus* and *P. glaucum* at 1 in 1,500, the other moulds requiring intermediate strengths. Brilliant green [see above, p. 105] was lethal in 48 hours to all the species of *Aspergillus* and the two of *Mucor* at 1 in 5,000, to *C. herbarum* at 1 in 4,000, and to *P. glaucum* and *Citromyces pfefferianus* at 1 in 2,500. Malachite green destroyed *C. pfefferianus* in 48 hours at 1 in 6,000, *Pullularia pullulans* at 1 in 3,000, and the rest at intermediate strengths.

Data are also given concerning the effects of the chemicals on two species of *Saccharomyces* and two of *Torula*, and comparative figures are included in a final table for [unspecified] bacteria used in a previous series of trials.

Brown (J. G.) & Streets (R. B.). **Diseases of field crops in Arizona.**—*Arizona Agric. Exper. Stat. Bull.* 148, pp. 85–228, 57 figs., 1 diag., 1 map, 1934.

This comprehensive and well-illustrated publication opens with a key to the most important fungal and bacterial diseases [arranged by the hosts] of the chief field crops in Arizona. The diseases are dealt with in semi-popular terms, including a brief account of their relative economic importance, spread in the State, external symptoms, and control; preventive measures, namely, seed treatments and soil disinfection, are discussed at some length in a final section.

Robbins (W. J.). **Isolation of the infective principle of virus diseases.**—*Science*, N.S., lxxx, 2073, pp. 275–276, 1934.

After briefly reviewing some recent estimates of the dimensions of the tobacco mosaic and other viruses [*R.A.M.*, xiii, p. 588], the writer presents a table showing how great the number of infective particles per c.c. of juice must be if an appreciable quantity of an infective principle of molecular weight of the order of 100,000 can be isolated from a reasonable quantity of juice. From the available data it is apparent that if 0·1 gm. of infective material of molecular weight of 100,000 exists in 6 l. of juice the number of infective particles would

necessarily be 10^{14} per c.c., or one million times as high as indicated by the work of previous investigators.

Sukhoff (K. S.) & Lanshina (Mme M. N.). Патологические изменения в растительных клетках при действии иодистого калия. (В связи с вопросом о природе X-тел). Предварительное сообщение. [Pathological changes in plant cells caused by the action of potassium iodide. (In connexion with the problem of the nature of the X-bodies.) Preliminary communication.]—ex *Вирусные болезни растений в Крыму и на Украине* [*Virus diseases of plants in the Crimea and the Ukraine*], pp. 122–124, 3 figs., Госуд. Издат. Крым [State Publ. Office for the Crimea], Simferopol, 1934. [German summary.]

The authors state that they found intracellular inclusions, closely resembling the X-bodies found by other workers in the cells of plants affected with virus diseases, in the growing point of beet seedlings watered with a 0·01 per cent. potassium iodide solution, which is stated to cause a necrosis of the seedlings (Schmidt. Ueber Jodnekrose an Zuckerrübenkeim: *Angew. Bot.*, [xiv, p. 229], 1932) [cf. *R.A.M.*, xiv, p. 51]. Such inclusions were absent from the cells of untreated beet seedlings.

Kostoff (D.). **Inheritance of natural immunity in plants with special reference to breeding of immune varieties.**—*Zeitschr. für Züchtung*, A, xix, 4, pp. 550–576, 1934.

Following a brief outline and discussion of the nature of immunity in plants, the influence of environmental factors on resistance to disease, and the nature of pathogens, the author, writing from the Genetic Laboratory of the Academy of Sciences, Leningrad, defines the present status of genetic research on natural immunity in plants in the light of contemporary investigations [cf. *R.A.M.*, xiii, pp. 390, 718]. A nine-page bibliography is appended.

Mikhailova (Mme P. V.) & Pivovarova (Mme R. M.). Об анатомическом методе диагностики вирусных болезней Картофеля. [Considerations on the anatomical method of diagnosing virus diseases of the Potato.]—ex *Вирусные болезни растений в Крыму и на Украине* [*Virus diseases of plants in the Crimea and the Ukraine*], pp. 93–108, Госуд. Издат. Крым [State Publ. Office for the Crimea], Simferopol, 1934. [German summary.]

After a brief discussion of the difficulties presented by the differential diagnosis of potato virus diseases, the authors give a tabulated account of their studies in the attempt to differentiate the diseases of this group that occur in the Ukraine by the anatomical changes caused by each in the different tissues of the hosts, more particularly in the tubers. The results [given in a table] incline them to accept Quanjer's classification [*R.A.M.*, x, p. 746] rather than the views expressed by von Brehmer and Rokhlina [ibid., xi, p. 121]. They distinguish in the Ukraine: (*a*) anecrotic mosaic (aucuba); (*b*) necrotic mosaic (streak or rugose mosaic, which are considered to be identical); and (*c*) phloem

necrosis (leaf roll), the anatomical symptoms of which are described in some detail.

The results of microchemical tests of the tissues in process of necrosis indicated that the browning of the cells and other chemical changes begin before the death of the cells. On general lines, the anatomical method of differentiation of the virus diseases is considered to be a very promising one.

Ryjkoff (V. L.) & Mikhailova (Mme P. V.). О природе **Pseudocommunis sp.** [On the nature of *Pseudocommunis* sp.]—ex *Вирусные болезни растений в Крыму и на Украине* [*Virus diseases of plants in the Crimea and the Ukraine*], pp. 114–121, 5 figs., Госуд. Издат. Крым [State Publ. Office for the Crimea], Simferopol, 1934. [German summary.]

The authors state that in their cytological studies of potato tubers affected with various virus diseases in the Ukraine they constantly found the presence in the neighbourhood of necrotic spots of intracellular bodies apparently identical with Debray's description and figures of *Pseudocommunis* [*Pseudocommis*] *vitis* [*Rev. de Vitic.*, 1895]. These bodies were also occasionally seen in the tissues of virus-diseased potato stems. Microchemical tests [details of which are given] showed that they are a product of cell metabolism under the influence of certain pathological processes [cf. *R.A.M.*, i, p. 72].

Sanford (G. B.). **A malady of the Potato in Alberta similar to psyllid yellows.**—*Scient. Agric.*, xv, 1, pp. 46–48, 1 pl., 1934.

The author states that potato crops in central Alberta have been sporadically affected since 1919, with the exception of a few years, by a pathological condition closely resembling the psyllid yellows described from Utah [*R.A.M.*, xii, p. 461]. In 1932 the trouble broke out very severely in and about Medicine Hat in southern Alberta, where over 100 acres of the crop were totally destroyed by it, and tomato plants near by were similarly affected; it did not recur in 1933. It is pointed out that four species of *Paratrioza* are known to occur in Alberta, but *P. cockerelli*, the insect responsible for initiating the disease in Utah, has not been definitely recorded from the province.

Holmes Smith (E.). **Sprain(g) or internal brown fleck of Potatoes. (Pseudomonas solaniolens, Paine.)**—*Gard. Chron.*, xcvi, 2489, pp. 178–179, 2 figs., 1934.

Reporting an attack of spraing (*Pseudomonas solaniolens*) [*R.A.M.*, iii, p. 420; xiii, p. 650] on a four- to five-acre stand of Ninetyfold potatoes at Northwich, Cheshire, in June, 1934, the writer briefly surveys the available information on the disease and describes some personal observations on it. In the Northwich case some diseased tubers were inadvertently included among the seed used for planting, and evidently the combination of light soil and a dry season so favoured the disease as to induce its recurrence in an intensified form, every plant in the drills in which the infected seed tubers had been planted producing only a few half-sized tubers all showing spraing. From all accounts this disease has been exceptionally prevalent in 1933 and 1934 in parts of England and on the Continent.

Wheeler (E. J.) & Moore (H. C.). **Potato seed treatment tests.**—*Michigan Agric. Exper. Stat. Special Bull.* 246, 19 pp., 5 figs., 1933. [Received December, 1934.]

Satisfactory scab [*Actinomyces scabies*] control was not given by seed potato treatment with mercuric chloride or semesan bel in six years' experiments [the results of which are fully tabulated and discussed] in Michigan [*R.A.M.*, xiii, p. 536]. Under the same soil conditions the Irish Cobbler variety showed a high degree of susceptibility to scab while Russet Rural proved fairly resistant. In general, clean untreated seed gave higher yields than diseased treated seed. Semesan bel, Bayer dip dust, and sanoseed gave practically the same results in all the trials and none was superior to mercuric chloride in scab control. Both with scab and black scurf (*Rhizoctonia*) [*Corticium solani*: ibid., xiii, p. 496] a longer treatment than half an hour's immersion in 30 galls. mercuric chloride solution (4 oz. in 30 galls. water) did not improve control, the yield differences in fact being in favour of the shorter period (9·5 and 11·8 bushels increase with Cobblers and Rurals, respectively). Hot formaldehyde, calomel (mercurous chloride), and acidulated mercuric chloride were no more effective than the standard mercuric chloride in disease control, and the first-named showed a marked tendency to reduce the yields. The chemical analysis of mercuric chloride solutions after treating eight lots of seed by renewing the solution four times showed that nearly 2 oz. more mercuric chloride per 30 galls. was present than before the commencement of treatment.

Soil conditions are evidently of greater importance than seed treatment in the prevention of scab and *C. solani*, especially the former. Some evidence was obtained that sulphur (250 to 600 lb. per acre) may give good control of *A. scabies*, while in one series of tests in 1932 promising results were given by aluminium sulphate (50 or 25 lb. per acre), copper sulphate (250 lb.), semesan bel (50 lb.), and mercuric oxide (15 lb.). Cultural measures tending to decrease the incidence of scab are briefly indicated.

Schaal (L. A.). **Relation of the Potato flea beetle to common scab infection of Potatoes.**—*Journ. Agric. Res.*, xlix, 3, pp. 251–258, 4 figs., 1934.

The results of the experiments briefly described in this paper showed that under field conditions in the Greeley area of Colorado the larvae of the potato flea beetle (*Epitrix cucumeris*) carry the organism of potato common scab (*Actinomyces scabies*) both internally and externally, and thus may cause scab infection of the potato tubers on which they feed. Aseptically hatched larvae did not contain the organism.

Lauritzen (J. I.) & Harter (L. L.). **Prevent storage rot of Sweet Potatoes.**—*U.S. Dept. of Agric. Leaflet* 106, 6 pp., 3 figs., 1934.

Directions are given for the prevention of black rot [*Ceratostomella fimbriata*], surface rot [*Fusarium oxysporum*], Java black rot [*Diplodia tubericola*], *Fusarium* rot, and *Rhizopus* soft rot among stored sweet potatoes [*R.A.M.*, iv, p. 699; ix, p. 290; xi, p. 535 *et passim*] by careful

handling, thorough cleaning and disinfection of the storage house, ten days' curing at a temperature of 80 to 85° F. and a relative humidity of 90 per cent., followed by an adjustment to 55° and 85 to 90 per cent., respectively, for the remainder of the storage period, and (for black rot) eight minutes' immersion of the roots in mercuric chloride (1 oz. in 8 galls. water).

Loh (T. C.). **An improved method for the control of seed-borne diseases of Rice.**—*Lingnan Sci. Journ.*, Canton, China, xiii, 4, pp. 603–605, 1934.

Very satisfactory control of seed-borne rice diseases is stated to have been obtained in the Canton district of China by a modification of the hot mercuric chloride treatment, in which 25 to 30 minutes' immersion in a cold 1 per cent. mercuric chloride solution is preceded by several hours' soaking of the infected grains under a suction pump. An electric suction pump accomplishes the necessary work about three times faster than an ordinary water pump or hand exhauster. Surplus water should be drained off the grains before their immersion in the mercuric chloride solution.

Gonçalves da Cunha (A.) & Bensaude (Matilde). **Sur l'existence d'une Pythiacée sur le Riz au Portugal.** [On the occurrence of a member of the Pythiaceae on Rice in Portugal.]—*Comptes rendus Soc. de Biol.*, cxvii, 33, pp. 733–734, 1934.

In May, 1934, the writers examined a sample of rice seeds from Benavente, none of which had germinated. Each seed was enveloped in a fragile mucilaginous sheath, which was found to consist of a bacterial zoogloea permeated by the non-septate hyphae of a Pythiaceous fungus. Cultured in Petri's solution, these hyphae produced abundant piriform zoosporangia of considerable dimensions which liberated numerous uniciliate, reniform zoospores. All that remained of the affected seeds was their external layers, the embryo and albumin having been almost completely destroyed.

Destructive rice diseases caused by *Pythiomorpha miyabeana* and *P. oryzae* (referred by Miss C. Buisman to *Phytophthora*) have been reported from Japan [*R.A.M.*, xi, p. 397], while a *Pythium* is recorded from Java as an agent of infection in rice fields [ibid., x, p. 298]. Taxonomic studies on the Portuguese fungus are in progress.

Tullis (E. C.), Jones (J. W.), & Davis (L. L.). **The occurrence of stem rot of Rice in California.**—*Phytopath.*, xxiv, 9, p. 1047, 1934.

Stem rot of rice (*Leptosphaeria salvinii*) [*R.A.M.*, xiii, p. 395] was observed in the conidial [*Helminthosporium sigmoideum*] and sclerotial [*Sclerotium oryzae*] stages in California in 1932 on a stand of Early Prolific grown from Arkansas seed on which the fungus was presumably introduced in 1931. In 1933 the disease was again found on the same variety in a commercial field and on six others in experimental plots.

ENDO (S.). **Influence of salt on the pathogenicity of Hypochnus sasakii Shirai.**—*Trans. Tottori Soc. Agric. Sci.*, iv, 3, pp. 362–367, 1933. [Abs. in *Biol. Abstracts*, viii, 8, p. 1908, 1934.]

The pathogenicity of *Hypochnus* [*Corticium*] *sasakii* on rice seedlings in Japan [*R.A.M.*, xiii, p. 725] was found to be greatly influenced by the addition of salt to the soil or sand in which the plants were grown, infection being absent when salt concentrations of 1 per cent. or more were reached. The growth of the mycelium on culture media was depressed by the addition of salt, being inhibited at a strength of 5 per cent. or above. The rice plants themselves were also retarded in growth by the salt treatment.

REYES (G. M.). **A new or little-known Rice disease occurring in the Philippines.**—*Philipp. Journ. of Agric.*, v, 3, pp. 123–141, 6 pl., 1934.

A description is given of a hitherto unrecognized *Fusarium* infection causing foot rot and wilt of rice over a limited area in Rizal Province, Philippine Islands. The initial yellowing of the outer leaves is followed by wilting of the younger foliage and finally by the death of the plant. Frequently one or more tillers in a stool turn yellow or die while the rest remain outwardly healthy. The vascular tissues of infected plants show a brown discoloration, and on splitting the stems in an advanced stage of decay a dense accumulation of fungal growth may be found in the hollows round the nodes. White or pale salmon-coloured fungal outgrowths may also be seen from ground level upwards on the sheaths and stems in advanced cases.

Morphological and physiological studies on the causal organism indicate that it is probably identical either with the *Fusarium* stage of *Gibberella moniliformis* (*F. moniliforme*) or with that of *G. fujikuroi* [*R.A.M.*, xii, p. 590; xiii, p. 801].

The pathogenicity of the fungus has been demonstrated by inoculation experiments, successful infection being obtained either by placing the fungus between the two outermost leaf sheaths or by spraying the top of the plant with a spore suspension in water. The former method was the most effective. Soil inoculations gave a lesser percentage of successes, and there was no evidence that the disease is seed-borne. Infection progresses rather slowly and the disease is not considered to be particularly virulent. Control measures should include the destruction of diseased material, protracted crop rotation, and the cultivation of resistant varieties, such as Biñan, Matayosa, Visaya, Guinagang Str. 1, Gallano, and Kinatuday.

TODD (RAMONA L.). **Fungi at various depths in typical Cleveland County, Oklahoma soils.**—Reprinted from *Proc. Oklahoma Acad. Sci.*, xiv, 4 pp., 1 diag., 1 graph, 1934.

This is an expanded account of the writer's statistical investigations, covering a period of one year, on the fungi occurring at various depths in typical soils of Cleveland County, Oklahoma, a preliminary note on which, giving the essential information, has already appeared [*R.A.M.*, xii, p. 324].

JENSEN (H. L.). **Contributions to the microbiology of Australian soils. I. Numbers of micro-organisms in soil, and their relation to certain external factors.**—*Proc. Linn. Soc. New South Wales*, lix, 3–4, pp. 101–117, 3 graphs, 1934.

The results obtained [which are tabulated and fully discussed] in a study of the numbers of micro-organisms present in fifty soils from New South Wales, and their relation to certain external factors showed that a correlation obtained between the organic content and the numbers of bacteria, actinomycetes, and fungi, most pronounced in the case of bacteria and least in that of actinomycetes. Soil reaction had no effect on the numbers of bacteria and actinomycetes but was significantly correlated with the numbers of fungi. The ratio of fungi to bacteria + actinomycetes was correlated with soil reaction except in the case of soils abnormally poor in the two last-named groups. In this series of observations moisture content had no influence on any of the three groups, but several soils from dry areas were very poor in fungi.

Periodical counts in a soil from Sydney showed a strong positive correlation between moisture content and numbers of bacteria and a less pronounced one between moisture and numbers of fungi. None of the three groups of organisms showed any correlation with temperature or any seasonal changes in numbers save those resulting from changes in moisture [*R.A.M.*, xii, pp. 140, 721].

A bibliography of 28 titles is appended.

OLSEN (C.). **The absorption of manganese by plants.**—*Comptes-rendus Trav. Lab. Carlsberg*, xx, 2, 34 pp., 2 figs., 10 graphs, 1934.

A detailed, tabulated account is given of the writer's investigations in Denmark on the manganese (and in some cases also the iron) content of the leaves of various wild plants. Barley and buckwheat collected from soils of varying hydrogen-ion concentrations were grown in artificial soil mixtures of different P_H values. A further series of tests was made to determine the iron and manganese contents of plants grown in water cultures with and without manganese. Analyses are also given of the manganese content of various cultivated plants from grey speck soil before and after the addition of manganous sulphate [*R.A.M.*, xii, p. 19, and next abstract].

It was found that land plants growing under natural conditions absorb increasing amounts of manganese with a rising hydrogen-ion concentration of the soil, so that in strongly acid soils they contain an excess of manganese over iron. However, in plants grown in water cultures of differing P_H values but a constant concentration of manganous sulphate, the maximum amount of manganese was absorbed between P_H 6 and 7. Oats do not suffer from grey speck in all soils with a P_H value exceeding 7, and in basic soils the presence or absence of the disorder seems to depend chiefly on the structure and humidity of the soil. Thus, the disease is less severe on clay than on sand and on moist than on dry soil. It has further been observed that plants are not affected by grey speck disease in places where the soil is firmly compressed, e.g., by deep wheel tracks. Evidently, therefore, the extent of oxygen access is decisive for the development of the disturbance; any reduction in the oxygen content

of the soil resulting from compression or liberal watering facilitates the formation of small quantities of manganous salts assimilable by the plants. The well-established curative action of manganous sulphate on oats in grey speck-diseased soil appears to persist for several years, during which time it is converted into manganese dioxide.

WILD (A. S.). **Further field experiments with manganese as a control of grey speck disease in Western Australia.**—*Journ. Dept. of Agric. Western Australia*, xi (Ser. 2), 2, pp. 223–225, 1934.

A concise, tabulated account is given of experiments conducted at Tinkurrin, Western Australia, in the control of grey speck disease of Bencubbin wheat [*R.A.M.*, ix, p. 741, and preceding abstract] by the application to the soil of manganese sulphate at the rate of 14 or 56 lb. per acre in addition to the ordinary superphosphate dressing (112 lb. per acre). The best results were given by the smaller application of manganese sulphate, the plots thus treated yielding an average of 21 bushels 48 lb. per acre as compared with 15 bushels 28 lb. for the higher rate and 13 bushels 34 lb. for the controls. It is estimated that applications of manganese sulphate ranging from 14 to 28 lb. per acre will adequately combat the manganese deficiency disease of wheat and oats on the slightly acid, non-calcareous soils, containing a fairly high proportion of ferruginous (lateritic) gravel, of the district.

MCRAE (W.). **Foot-rot diseases of Piper betle L. in Bengal.**—*Indian Journ. Agric. Sci.*, iv, 4, pp. 585–617, 1 diag., 1934.

This is a detailed report of the author's investigation of the foot rot of betel vines (*Piper betle*) [*R.A.M.*, xiii, p. 12], which is stated to be very prevalent in all betel vine-growing areas of India. The earliest symptom of the disorder is a darkening of the stem at the 'foot' of the plant near ground level; this is soon followed by a wilt of the diseased stems, the cortex of which undergoes a soft and sometimes slimy rotting, usually over about three nodes and internodes. The disease, which was shown to be localized to the discoloured parts of the stems, was found to be associated with several fungi, including *Glomerella cingulata* which, however, proved to be incapable by itself of producing disease symptoms in betel vines, though when placed on a lesion caused by *Phytophthora*, it grew rapidly and accentuated the symptoms.

Of the three species isolated from diseased vines which have been demonstrated to be pathogenic, comparative cultural and inoculation studies [considerable details of which are given] showed two to be *Rhizoctonia* [*Corticium*] *solani* and *Sclerotium rolfsii*, the latter being relatively unimportant in Bengal, while the former causes damage to the vines soon after the rains and in the early part of winter. The third fungus, which is responsible for much of the damage done in Bengal, was found to be referable to *P. parasitica*, a strain of which, causing a similar disease of betel vines, was also obtained from Malaya [cf. ibid., xii, p. 355]; a third strain from Madras, also causing a foot rot of the vines, appeared to be different in its sporangial measurements, and its systematic position still remains to be determined.

In comparative inoculations with *P. colocasiae* from *Colocasia antiquorum* (Pusa) and *P. palmivora* from *Borassus flabelliformis* (Godavari)

it was found that the spots produced on *C. antiquorum* by the other species of *Phytophthora* were quite different from those produced by *P. colocasiae*, while only the strains of *P. parasitica* from *Ricinus communis* (Pusa) and the fungi isolated from betel vine could infect *R. communis*. A statistical examination of the conidial dimensions of these and some other allied species showed that *P. colocasiae*, *P. meadii* from *Hevea* rubber (Cochin), *P. faberi* [source not stated], and the Madras betel *Phytophthora* were significantly distinct from one another and from *P. parasitica* and the other two betel strains. The three last-named, however, were closely similar and also came rather near *P. palmivora*.

Cultural experiments indicated that temperatures between 20° and 30° C. were the most favourable for the growth of the three betel pathogens, the optimum for *C. solani* appearing to be towards the lower end of this range, while *S. rolfsii* and *P. parasitica* seemed to be favoured by slightly higher temperatures. The thermal death point for *C. solani* was about 51°, for *S. rolfsii* 55°, and for *P. parasitica* 48°.

The paper terminates with a brief discussion of control measures, most of which have already been noticed from other sources [ibid., xii, p. 420].

Summers (E. M.). **Types of mosaic on Sugar Cane in Louisiana.**—*Phytopath.*, xxiv, 9, pp. 1040–1042, 1 fig., 1934.

In 1932 two quite distinct types of mosaic, (1) mild and (2) severe, were observed occurring spontaneously on adjacent stools of a single seedling variety, C.P. 28/60, in the United States Department of Agriculture nurseries at Houma, Louisiana. In 1933 two further types, (3) and (4), were collected in commercial fields of Co. 281. All four types have persisted without apparent change through successive vegetative propagations of the diseased plants, and were also readily perpetuated on differential varieties by needle-prick inoculations. On healthy Co. 281, Louisiana Purple, and P.O.J. 36-M, 213, and 234, types (1), (2), and (4) gave only indistinguishable mosaic symptoms. On C.P. 28/60, however, these types invariably reproduce their characteristic leaf patterns, while type (3) reproduced on all the test varieties its distinctive yellowish-white stripes. Type (4) is indistinguishable from (3) on C.P. 28/60 but invariably produced the ordinary mosaic pattern on Louisiana Purple, on which (3) causes severe striping.

The characteristic striping of type (3) consists of elongated, nearly white blotches or islands, some of which coalesce into long, yellowish-white streaks, following the midrib and often accompanied by severe necrosis involving temporary or permanent blighting of the growing point. It appears to be very limited in distribution.

Kuplenskaya (Mme O. I.). **Physiological investigation of micro-organisms, Fusarium betae, Macrosporium commune and Verticillium lateritium.**—*Trans. Central Sci. Res. Inst. Sugar Ind.* (U.S.S.R.), 12, pp. 54–63, 1933. [Abs. in *Chem. Abstracts*, xxviii, 20, pp. 6774–6775, 1934.]

Fusarium betae [*F. merismoides* var. *majus*: *R.A.M.*, xi, p. 624] inverts cane sugar, consuming the products of inversion. Alcohol and organic acids are formed in the biological process. The fungus is able to

decompose the pectin substances, and can grow between P_H 2·5 and 9 without requiring much aeration. It is resistant to antiseptics and withstands low temperatures. *Macrosporium commune* [? *Pleospora herbarum*: ibid., xiii, p. 795] also inverts cane sugar, but does not consume the products as rapidly as the foregoing. It grows best between P_H 3·5 and 8·2. *Verticillium lateritium* [ibid., ix, p. 58], on the other hand, inverts cane sugar slowly, is very sensitive to temperature variations, and can exist only within a limited P_H range.

HERBERT (D. A.). **Records of Queensland fungi.—I.**—*Queensland Naturalist*, ix, 3, pp. 44–46, 1934.

A list is given of 21 species of fungi supplementary to that given in F. M. Bailey's catalogue of Queensland plants and not including the numerous records of pathogenic fungi made by the officers of the Department of Agriculture and Stock.

PETRAK (F.). **Mykologische Notizen. XII.** [Mycological notes. XII.]—*Ann. Mycol.*, xxxii, 5–6, pp. 317–447, 1934.

Critical and taxonomic notes are given on Nos. 751 to 850 of the present series of fungi [cf. *R.A.M.*, xi, p. 328]. *Physalospora perseae* Doidge, the agent of a serious disease of avocado pears (*Persea americana*) [*P. gratissima*] in South Africa [ibid., iii, p. 92] is redescribed, considered to be a typical *Melanops*, and renamed *M. perseae* (Doidge) Petrak. It is characterized by depressed-spherical, broadly ellipsoid, elongated to conical or irregular, carbonaceous, ostiolate perithecia, 100 to 140 μ in height, 130 to 200 μ in breadth; clavate, short-stalked or subsessile, thick-walled asci, 70 to 90 by 16 to 22 μ, each containing eight elongated or extended-ellipsoidal to clavate or extended-oval, hyaline, unicellular ascospores, 18 to 23 by 7·5 to 10 μ; and profusely branched, septate paraphyses, 2 to 3 μ in width.

DRECHSLER (C.). **Phytopathological and taxonomic aspects of Ophiobolus, Pyrenophora, Helminthosporium, and a new genus Cochliobolus.**—*Phytopath.*, xxiv, 9, pp. 953–983, 3 figs., 1934.

A very fully documented discussion is given of the historical, taxonomic, and morphological position of the genus *Ophiobolus*, the interest of which in the phytopathological sphere centres mainly round *O. graminis* and *O. herpotrichus* [*R.A.M.*, xiii, p. 297]. The latter, not hitherto reported in the United States, has been found of recent years to occur extensively on dead quack grass (*Agropyron repens*) stems from April to early June in Wisconsin, New York, Maryland, and Virginia. Its early implication in the causation of foot rot of cereals in Italy and Germany is thought to be due to a failure to recognize the difference between it and *O. graminis*. It is now, however, considered in Germany and Holland to be a parasite of secondary importance, in agreement with the position long held in France [ibid., ix, p. 586; x, p. 446; xiii, p. 569]. Neither these two closely related species nor *O. oryzinus* [ibid., xii, p. 655], probably a member of the same series, appear to be nearly related to the generality of forms comprised in *Ophiobolus* [which are enumerated], or with the helicoid ascigerous series of graminicolous

species with bipolar germination referred in their conidial stage to *Helminthosporium*.

Of the general run of species in *Ophiobolus*, more asexual stages are recorded of the *Phoma* type than of any other. *Phoma* stages developed in cultures of *O. fulgidus* isolated from *Ambrosia trifida* and also in a second species from the same host, often but incorrectly referred to *O. fulgidus*.

Of more than a dozen miscellaneous species of *Ophiobolus* from various hosts, none gave rise in maize meal agar cultures to a *Helminthosporium* stage or showed any resemblance in cultural or mycelial habit to representatives of the latter genus. It is concluded, therefore, that the helicoid ascigerous series of the *Ophiobolus* type, having a *Helminthosporium* conidial stage, constitutes a separate natural genus, to which the name *Cochliobolus* is given [with Latin and English diagnoses]. This genus has as its type species *C. heterostrophus* nov. comb. (*O. heterostrophus*) [ibid., vi, p. 547], a fungus causing leaf spot of maize.

The filamentous outgrowths sometimes occurring on *Cochliobolus* perithecia are considered to be intrusions of the vegetative and asexual reproductive stages rather than an integral feature of the ascigerous stage. Excessive emphasis on the presence or absence of setose excrescences as criteria for the differentiation of *Pyrenophora* and *Pleospora* is thought to have obscured the much more important and stable morphological divergences between these two genera. Through the elevation of *Chaetoplea* to generic rank by Clements and Shear (The genera of fungi. H. Wilson Co., New York, 1931) *Pyrenophora* is automatically rehabilitated as a natural genus in the sense defined and applied by Fuckel, being reserved for the hard sclerotioid perithecial forms having their asexual stages in the *Helminthosporium* forms such as *H. teres*, *H. bromi*, and *H. tritici-repentis* [see above, p. 90] with indiscriminate germination, corresponding broadly with Nisikado's subgenus *Cylindro-Helminthosporium* and Ito's genus *Drechslera* [*R.A.M.*, x, p. 233].

A bibliography of 80 titles is appended.

MUNDKUR (B. B.). **Perfect stage of Sclerotium rolfsii Sacc. in pure culture. (Preliminary announcement.)**—*Indian Journ. Agric. Sci.*, iv, 4, pp. 779–781, 1 pl., 1934.

Four Indian isolations of *Sclerotium rolfsii* from wilted cotton, betel vines (*Piper betle*), potato, and sugar-cane plants, produced a basidial stage on a special medium containing onions, asparagin, and proteose peptone [the preparation of which is described]. This stage appeared in from 40 to 45 days in cultures kept at a temperature of 30° to 31° C. which promotes the optimum growth of the fungus. It is stated to agree with Curzi's description of *Corticium rolfsii* [*R.A.M.*, xi, p. 749], and is tentatively referred to this species. The basidia are produced on dense white cushions and are rather short and aggregated in a crust 6 to 12 mm. in diameter. They are hyaline, septate at the base, clavate, and sometimes furnished with two, three, or four sterigmata, 3 to 5 μ long. Most of them, however, remain sterile. The basidiospores are obovate, globose, or slightly cylindrical, and measure 4·9 to 9·4 μ (mean 6·8$\pm$ 0·067 μ) by 2·6 to 7·1 μ (mean 4·9$\pm$0·057 μ).

BUGNICOURT [F.]. **Premières observations sur les maladies du Tabac dans le sud-indochinois programme d'études.** [Preliminary observations on Tobacco diseases in the southern Indo-Chinese study programme.]—*Bull. Écon. Indochine,* N.S., xxxvii, pp. 717–721, 3 pl., 1934.

Preliminary notes are given on the following tobacco diseases in southern Indo-China which are to form the object of more extensive pathological studies by the staff of the Agricultural Research Institute: mosaic (of widespread occurrence and causing heavy damage to 25 to 60 per cent. of the crop); wilts due to *Fusarium oxysporum* var. *nicotianae* and *Bacillus* [*Bacterium*] *solanacearum*, also responsible for heavy losses; *Phytophthora* [*parasitica* var.] *nicotianae*; wildfire (*Bact. tabacum*), hitherto observed only on old plants in the Govap and Hoc-mon districts; and sooty moulds, which impair the marketable value of the leaves.

KHESWALLA (K. F.). **Stem rot of Tobacco caused by Sclerotinia sclerotiorum (Lib.) de Bary.**—*Indian Journ. Agric. Sci.*, iv, 4, pp. 663–673, 4 pl., 1934.

The investigation in 1932 of a serious outbreak of a rot at ground level of the stems of tobacco at the Tobacco Farm at Rangpur, Bengal, showed the disease to be caused by *Sclerotinia sclerotiorum* [*R.A.M.*, xii, p. 729]. The fungus grew best at temperatures between 20° and 25° C., but no growth was made at 30°. In rich media microconidia were produced late, when the available food was used up by the fungus, while in poor media they formed within a short time. Mature apothecia were produced from sclerotia formed in culture and on the host, and tests showed that the ascospores can infect wounded tobacco leaves; in one experiment the ascospores infected one out of eight uninjured leaves that were sprayed with a spore suspension. Low temperature was found to be one of the factors determining the development of apothecial stalks, and light is essential for their expansion into disks. A *Botrytis* stage was not found in the life-history of this fungus.

HOLMES (F. O.). **Inheritance of ability to localize Tobacco-mosaic virus.**—*Phytopath.*, xxiv, 9, pp. 984–1002, 3 figs., 1934.

The localization of the tobacco mosaic virus in the neighbourhood of the infected spots, so that it does not become systemic [*R.A.M.*, xiv, p. 61], in hybrids between (1) the Tabasco and Ruby King and (2) the Golden Dawn and *minimum* varieties of garden pepper (*Capsicum frutescens*) [*C. annuum*] was shown by tests [details of which are given] to be determined by a dominant Mendelian factor. In plants possessing this factor (of which this is believed to be the first record in connexion with a virus disease) the infective principle increased in tissues at the site of inoculation, causing the development of numerous small, necrotic areas, followed by the early abscission of the inoculated leaf and subsequent healthy growth of the plant to maturity. The recessive allelo-

morphs, on the other hand, responded to inoculation by systemic extension of the virus, stunting of the plant, foliar mottling and distortion, and reduced yield of fruit.

Somewhat similar genetic factors, determining a necrotic response, were found to operate in a number of crosses between species of *Nicotiana* (e.g., *N. caudigera* × *N. acuminata* and *N. sanderae* × *N. langsdorffii*), as well as in eggplant varietal crosses (Peking Green × Black Beauty and Hangchow Long × Black Beauty).

WHITE (P. R.). **Multiplication of the viruses of Tobacco and aucuba mosaics in growing excised Tomato root tips.**—*Phytopath.*, xxiv, 9, pp. 1003–1011, 1 graph, 1934.

Making use of the fact that the root tips of tomato are capable of apparently indefinite growth in an isolated state under controlled environmental conditions, the author has cultivated the viruses of tobacco and aucuba (tomato) mosaic [*R.A.M.*, xiii, pp. 648, 661] in tomato root tips grown *in vitro*. The stem of a rapidly growing Bonny Best tomato, heavily infected by tobacco mosaic, was cut into segments which were thoroughly washed and suspended in 3-litre Erlenmeyer flasks containing a little water in such a way as to touch neither the flask nor the water. After 11 days 18 root tips were removed from the basal portions of the cuttings and placed in flasks containing 50 ml. of a nutrient medium [the composition of which is indicated]. Of the 18 roots cultured only six survived, and after a week these were cut into pieces some 10 mm. in length; the apices and some subapical portions were transferred to fresh flasks, while the discarded basal parts were tested for the presence of virus by crushing and rubbing into *Nicotiana glutinosa* leaves. Virus was found to occur in all six roots, the number of lesions produced by individuals ranging from 22 to 500. A single root tip was selected to serve as the parent stock for subsequent cultures.

The clone was grown in the laboratory and subcultured weekly for a period of 30 weeks. At the fourth passage it comprised 50 cultures, and this number was maintained up to and including the seventh passage, after which the number was reduced to 25. At the end of the 20th and 30th passages, inoculations were made from cultures Nos. 5, 10, 15, 20, and 25 into tobacco and *N. sylvestris* plants, while at the same time, tissue from each root was inoculated into a leaf of *N. glutinosa*. Characteristic local lesions were induced on the latter by every culture except No. 25, the failure of which was probably accidental since the infections produced by other pieces of the same root on tobacco and *N. sylvestris* were fully systemic. Thirty passages in growing isolated root tips had thus apparently not impaired the virulence of the infective principle. Similar results were obtained with aucuba mosaic after 25 passages. Both viruses are being maintained in further subcultures.

The roots infected with the tobacco and aucuba mosaic viruses showed absolutely no external symptoms of disease, and it was further shown experimentally that the virus does not escape from the infected tissues into the medium, nor is it easily transferable to healthy roots by contact with diseased ones or with virus-containing media.

The possible applicability of this method of cultivation to some well-known animal viruses is briefly discussed.

KARATCHEVSKY (I. K.). Био-химическое исследование столбурного заболевания Томатов. [Biochemical studies of the 'stolbur' disease of the Tomato.]—ex *Вирусные болезни растений в Крыму и на Украине* [*Virus diseases of plants in the Crimea and the Ukraine*], pp. 74–78, Госуд. Издат. Крым [State Publ. Office for the Crimea], Simferopol, 1934. [German summary.]

The results of the experiments briefly described in this paper showed that the total content of tomato plants affected with 'stolbur' (local popular name for the 'fruit woodiness' disease) [*R.A.M.*, xiii, p. 133, and next abstract] in carbohydrates (particularly in reducing sugars and starch) is considerably lessened as compared with that of healthy plants, the reverse being true of the total nitrogen content. In the light of Dunlap's attempt to classify virus diseases according to the C/N ratio in the affected host plants [*R.A.M.*, ix, p. 667], these results would appear to support the view of the Russian workers that tomato 'fruit woodiness' belongs to the 'yellows' group of virus diseases rather than to the true mosaic group.

MIKHAILOVA (Mme P. V.). Анатомия одеревенения плодов у Помидора. [Anatomy of Tomato plants affected with fruit woodiness.]—ex *Вирусные болезни растений в Крыму и на Украине* [*Virus diseases of plants in the Crimea and the Ukraine*], pp. 79–92, 10 figs., Госуд. Издат. Крым [State Publ. Office for the Crimea], Simferopol, 1934. [German summary.]

A full account is given of the author's comparative studies of the anatomy of healthy tomato plants and of plants affected with 'fruit woodiness' [see preceding abstract]. The results showed that under the influence of the disease the vascular system of all the above-ground organs and tissues of the plant is accelerated in its development and is hypertrophied, as are also the green parts of the plant, though the fruits are atrophied. The investigation also showed that all the vegetative organs, except the leaf blades, are gorged with starch grains, and that the sieve-tubes of the much hypertrophied phloem in the stems, and more especially in the flower and fruit stalks, are filled with a light yellow substance of a nature as yet undetermined, which in all probability impedes the regular translocation of carbohydrates. The leaf-trace bundles from the calyx lobes are more prominent than normally so that the flower stalk becomes polystelic, while the segment between the calyx and corolla is lengthened and also polystelic. In the petals a palisade layer, absent from the normal ones, is often found. The structure of the mesophyll in the diseased leaves is characteristic of virus diseases, being almost entirely deprived of intercellular spaces and with a reduced differentiation of the palisade tissue. In the fruits, the fibro-vascular bundles become woody and may be felt from the outside; the annular and spiral vessels are transformed into pitted ones, and there is an abundant formation of libriform cells, which are almost entirely absent in healthy tomato fruits.